# DM240XR

## High-Speed Digital Modulator
## Installation and Operation Manual

IMPORTANT NOTE: The information contained in this document supersedes all previously published information regarding this product. This manual is subject to change without prior notice.

# DM240XR

## High-Speed Digital Modulator
## Installation and Operation Manual

Part Number MN-DM240XR
Revision 13

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Comtech EF Data, 2114 West 7th Street, Tempe, Arizona 85281 USA, 480.333.2200, FAX: 480.333.2161

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# PREFACE

## About this Manual

This manual describes the installation and operation for the Radyne DM240XR. This is an informational document intended for the persons responsible for the operation and maintenance of the DM204XR.

## Conventions and References

## Patents and Trademarks

See all of Comtech EF Data's Patents and Patents Pending at http://patents.comtechefdata.com.

Comtech EF Data acknowledges that all trademarks are the property of the trademark owners.

## Related Documents

The following documents are referred to in this manual:

- EN300-421 and EN301-210 ETSI
- ETSI EN302-307
- *INTELSAT Earth Station Standards IESS-308, -309, -310, and -315*
- *EUTELSAT SMS*

## Cautions and Warnings

**IMPORTANT** ***or*** **NOTE** ***indicates a statement associated with the task being performed or information critical for proper equipment function.***

**CAUTION** ***indicates a hazardous situation that, if not avoided, may result in minor or moderate injury.*** **CAUTION** ***may also be used to indicate other unsafe practices or risks of property damage.***

**WARNING** ***indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.***

# Safety Compliance

## EN 60950

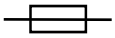
Applicable testing is routinely performed as a condition of manufacturing on all units to ensure compliance with safety requirements of EN60950.This equipment meets the Safety of Information Technology Equipment specification as defined in EN60950.

## Low Voltage Directive (LVD)

The following information is applicable for the European Low Voltage Directive (EN60950):

| | |
|---|---|
| <HAR> | Type of power cord required for use in the European Community. |
| | **CAUTION:** Double-pole/Neutral Fusing<br>**ACHTUNG:** Zweipolige bzw. Neutralleiter-Sicherung |

International Symbols:

| Symbol | Definition |
|---|---|
| ~ | Alternating Current |
|  | Fuse |

| Symbol | Definition |
|---|---|
| | Protective Earth / Safety Ground |
| | Chassis Ground |

***For additional symbols, refer to* Cautions and Warnings, *listed earlier in this Preface.***

# Warranty Policy

Comtech EF Data products are warranted against defects in material and workmanship for a specific period from the date of shipment, and this period varies by product. In most cases, the warranty period is two years. During the warranty period, Comtech EF Data will, at its option, repair or replace products that prove to be defective. Repairs are warranted for the remainder of the original warranty or a 90 day extended warranty, whichever is longer. Contact Comtech EF Data for the warranty period specific to the product purchased.

For equipment under warranty, the owner is responsible for freight to Comtech EF Data and all related customs, taxes, tariffs, insurance, etc. Comtech EF Data is responsible for the freight charges only for return of the equipment from the factory to the owner. Comtech EF Data will return the equipment by the same method (i.e., Air, Express, Surface) as the equipment was sent to Comtech EF Data.

All equipment returned for warranty repair must have a valid RMA number issued prior to return and be marked clearly on the return packaging. Comtech EF Data strongly recommends all equipment be returned in its original packaging.

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The warranty excludes any responsibility by Comtech EF Data Corporation for incidental or consequential damages arising from the use of the equipment or products, or for any inability to use them either separate from or in combination with any other equipment or products.

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| | |
|---|---|
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| IP-Enabled Satellite Modems<br>IP-Based Modem Accessories<br>Encapsulators, Receivers, Filtering & Encryption<br>*turbo*IP® Performance Enhancement Proxies (PEP)<br>SkyWire™ MDX420 Satellite Network Gateway | **Tel: +1.480.333.2433**<br>**Fax: +1.480.333.2161**<br>**Email: cdmipsupport@comtechefdata.com** |
| Vipersat Network Products<br>IP-Enabled Satellite Modems used in conjunction with VMS<br>Advanced VSAT Solutions used with VMS | **Tel: +1.510.252.1462 – select option #2**<br>**Fax: +1.510.252.1695**<br>**Email: supportcvni@comtechefdata.com** |

**After Hours and Weekends:**

Comtech EF Data – Tel: +1.480.333.4357
Radyne – Tel: +1.602.980.5220

# Chapter 1. INTRODUCTION

This chapter provides an overview of the DM240XR High-Speed Digital Modulator. The DM240XR will be referred to in this manual as "the DM240XR", "the modulator", or "the unit".

## 1.1 Description

***The New Standard in Digital Modulator Performance***
Radyne's DM240XR family of High-Speed Modulators is the ideal choice to meet the exacting standards of High Data-Rate Video, Internet and Fiber Restoral Satellite Applications. The DM240XR offers various options that comply to the international standards, supporting both DVB-S and DVB-S2 specifications. With a variety of frequency options and Plug-In Data Interfaces (PIIC), it provides greater flexibility for changing and upgrading the unit the required application.

The DVB-S Network specification complies with both EN300-421 and EN301-210 ETSI specifications. The DM240XR supports FEC rates of BPSK, QPSK, 8PSK and 16QAM applications with symbol rates up to 68 Msps.

The DVB-S2 Network specification complies with the next generation DVB open standard supported by ETSI EN302-307. At the core of this standard is a powerful Bose-Chaudhuri-Hocquenghem BCH encoder and concatenated Low-Density Parity Check (LDPC). The DVB-S2 FEC rates supported are BPSK, QPSK, 8PSK and 16APSK with symbol rates up to 45Msps.

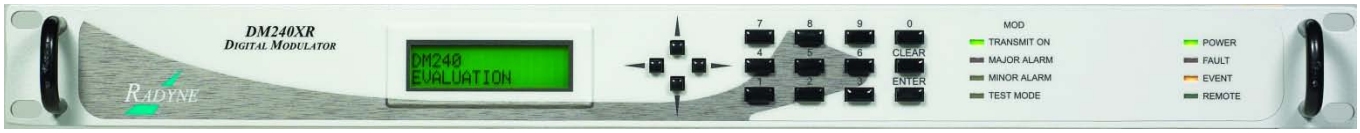



**Figure 1-1 DM240XR**

The powerful new onboard Monitor and Control (M&C) processor has the unique capability to download firmware and enhance features from a field-changeable Flash Card. Offering unprecedented flexibility, this feature represents a new level of Radyne outstanding Customer Support. Additionally, features are added to the installed equipment base with extreme ease, allowing the equipment to expand with changes in service while lowering initial installation budgets.The Modulator offers a frequency-agile IF Output from 50 to 90, 100 to 180 MHz (70/140), or 950 to 2050 MHz (L-Band) in 1 Hz steps. Variable data rates from 1 Mbps to 238 Mbps can be set in 1 bps steps.

The DM240XR, AutoEQ™ option supports SCPC equalization of Group Delay and Amplitude. Installing the AutoEQ™ PIIC Interface allows the ability to compensate for the overall system Group Delay and Amplitude Flatness over the satellite by pre-distorting the Uplink Carrier,

eliminating the need for external Group Delay/Amplitude Equalizers. AutoEQ™ will automatically generate the proprietary profile for the DM240XR to pre-distort the modulator, resulting in Amplitude and Group Delay equalization over the Satellite Link. The AutoEQ™ will operate over the full transponder from a symbol rate of 10.1 Msps to 45 Msps.

Additional features include the choice of remotely interfacing through one of three onboard connections: 10/100 Base-T Ethernet, RS-485, RS-232 or Web Browser. The familiar Radyne Front Panel (Figure 1-1) offers push-button control of all features and a backlit LCD display. Menus are specifically designed for ease of use and quick online operation as well as changes in all modulator configurations.

The DM240XR supports optional 1:1 Redundancy for data, IF or both offering superior system reliability based on customer needs and applications.

Redundancy Options support include:

- RCS11: 1 RU Chassis that supports redundancy for both IF (70/140MHz or L-band) and supports various data interfaces.
- RRS11: 1RU Chassis supports redundancy for either 70/140 MHz or L-band. Includes easy access to monitor ports for online and offline monitoring via the front panel. Power and control logic is supplied by a rear panel connector on the DM240XR.
- STS11: Small package design that supports redundancy for either 70/140 MHz or L-band. Includes easy access to monitor ports for online and offline monitoring via the front panel. Power and control logic is supplied by a rear panel connector on the DM240XR
- Data Redundancy: The DM240XR PIIC interfaces allows for data redundancy when dual interfaces are installed. The modulator can satisfy the user's applications when the system requires monitoring of the redundant data paths. Simply configure the redundant interface and the modulator will monitor the integrity of the data paths and switch in the event data is corrupted on either path.

# Chapter 2. Installation

This section provides unpacking and installation instructions, and a description of external connections and backward alarm information.

## 2.1 Installation Requirements

The DM240 can be installed within any standard 19-inch equipment cabinet or rack, and requires 1 RU mounting space (1.75 inches) vertically and 17 inches of depth. Including cabling, a minimum of 20-inches of rack depth is required. The rear panel of the DM240XR is designed to have power enter from the left and IF cabling enter from the right when viewed from the rear of the unit. Data and control cabling can enter from either side although they are closer to the center. The unit can be placed on a table or suitable surface if required.

***PROPER GROUNDING PROTECTION: During installation and setup, the user must ensure that the unit is properly grounded. The equipment shall be connected to the protective earth connection through the end use protective earth protection.***

***In addition, the IF input and output coax cable shielding must be properly terminated to the chassis/unit ground.***

***There are no user-serviceable parts or configuration settings located inside the DM240 Chassis. There is a potential shock hazard internally at the power supply module. DO NOT open the DM240 Chassis under any circumstances.***

***Before initially applying power to the unit, it is a good idea to disconnect the transmit output from the operating ground station equipment. This is especially true if the current DM240XR configuration settings are unknown, where incorrect settings could disrupt existing communications traffic.***

## 2.2 Unpacking

The DM240XR Modulator was carefully packaged to avoid damage and should arrive complete with the following items for proper installation:

- DM240XR Unit.
- Compact Flash Card. Must be installed.
- Power Cord, 6-foot with applicable AC connector.
- Installation and Operation Manual.

## 2.3 Removal and Assembly

Carefully unpack the unit and ensure that all of the above items are in the carton. If the Prime AC power available at the installation site requires a different power cord/AC connector, then arrangements to receive the proper device will be necessary before proceeding with the installation.

The DM240XR modulator is shipped fully assembled. It does not require removal of the covers for any purpose in installation. The only replaceable assembly in the unit is the data interface and is not intended to be accomplished in the field. Should the power cable AC connector be of the wrong type for the installation, either the cable or the power connector end should be replaced. The power supply itself is designed for universal application using from 100 to 240 VAC, 50 to 60 Hz, < 40 W.

## 2.4 Mounting Considerations

When mounted in an equipment rack, adequate ventilation must be provided. The ambient temperature in the rack should be between 10° and 35° C, and held constant for best equipment operation. The air available to the rack should be clean and relatively dry. The DM240XR units may be stacked one on top of the other up to a maximum of 10 consecutive units before providing a 1 RU space for airflow.

Do not mount the DM240XR in an unprotected outdoor location where there is direct contact with rain, snow, wind or sun. The DM240XR is designed for indoor applications only.

The only tools required for rack mounting the DM240XR is a set of four rack mounting screws and an appropriate screwdriver. Rack mount brackets are an integral part of the cast front bezel of the unit and are not removable.

Shielded cables with the shield terminated to the conductive backshells are required in order to meet EMC directives. Cables with insulation flammability ratings of 94 VO or better are required in order to meet low voltage directives.

## 2.5 Modulator Checkout

The following descriptions assume that the DM240XR is installed in a suitable location with prime AC power and supporting equipment available.

### 2.5.1 Initial Power-Up

***Before initial power up of the DM240XR, it is a good idea to disconnect the transmit output from the operating ground station equipment. This is especially true if the current modulator configuration settings are unknown, where incorrect setting could disrupt existing communications traffic. New units from the factory are normally shipped in a default configuration which includes setting the transmit carrier off.***

Turn the unit 'ON' by placing the rear panel switch (above the power entry connector) to the 'ON' position. Upon initial and subsequent power-ups, the DM240XR microprocessor will test itself and several of its components before beginning its main Monitor/Control program. These power-up diagnostics show no results if successful. If a failure is detected, the Fault LED is illuminated.

The initial field checkout of the DM240XR can be accomplished from the front panel, Terminal Port, Remote Port, or Ethernet Port.

**Notes:**

# Chapter 3. Theory of Operation

## 3.1 Theory of Operation

The advanced hardware/software architecture of the DM240XR allows a single piece of hardware to be configured for a variety of different applications. Several of these hardware/software platforms are listed in the next sections. Custom applications are available.

The basic operation of each platform is similar. A digital terrestrial interface supplies the modulator with a data stream. The data stream is synchronized if the incoming stream is framed. The data is scrambled, and FEC is added. The data is then convolutionally encoded, punctured, then constellation mapped. The resulting I&Q Symbols are digitally filtered. The data is then converted into an analog waveform and is vector modulated onto an RF Carrier produced from the Transmit IF Synthesizer Circuitry.

Since the baseband processing is completely digital, many different variations of signal processing can be performed. Therefore, the DM240XR is one of the most flexible digital modulators available today.

## 3.2 DVB-S Operation

The DVB-S version of the DM240XR complies with both EN300-421 and EN301-210 ETSI Specifications.

A block diagram of the signal flow is shown in Figure 3-1 below.

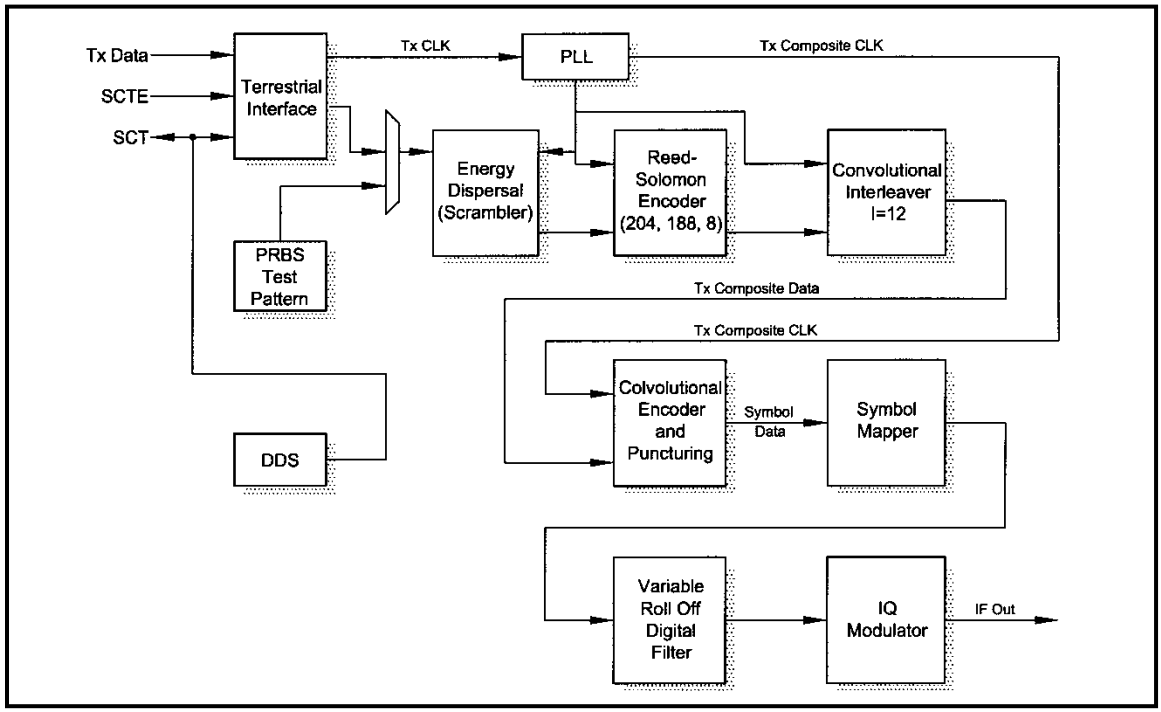



**Figure 3-1. Functional Block Diagram**

## 3.3 DVB-S2-BS-NBC Operation

The DVB-S2-BS-NBC version of the DM240XR complies with the ETSI EN 302 307 V1.1.1 (2004-01) specification for non-backward compatible broadcast services.

A block diagram of the signal flow is shown in Figure 3-2 below.

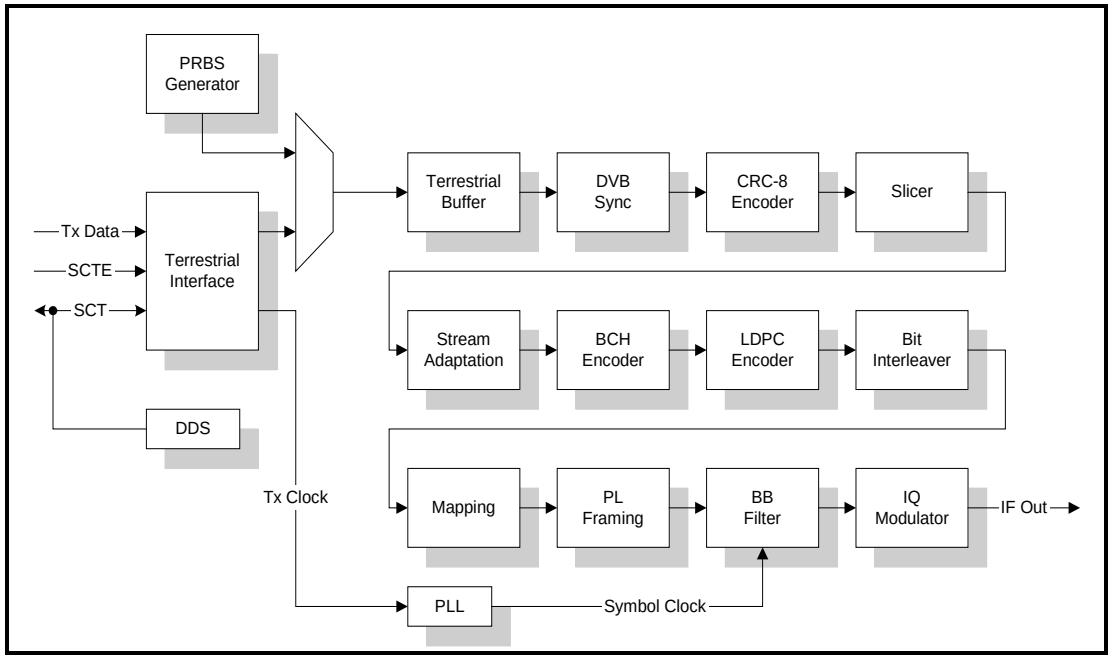



**Figure 3-2. Functional Block Diagram**

# Chapter 4. User Interfaces

## 4.1 User Interfaces

There are four user interfaces available for the DM240XR family of products. These are:

- Front Panel
- Remote Port
- Ethernet Port
- Terminal

## 4.2 Front Panel User Interface

The front panel of the DM240XR allows for complete control and monitor of all DM240XR parameters and functions via a keypad, LCD display and status LEDs.

The front panel layout is shown in Figure 4–1, showing the location and labeling of the front panel. The front panel is divided into three functional areas: the LCD display, the Keypad and the LED Indicators, each described below in Table 4-1.

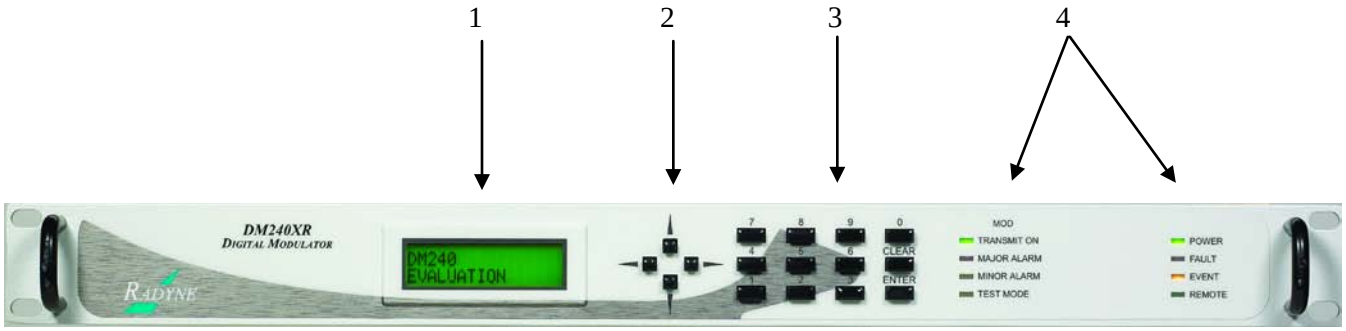



**Figure 4-1. DM240XR Front Panel**

**Table 4-1.**

| Item Number | Description | Function |
|---|---|---|
| 1 | LCD Front Panel Display | Displays DM240XR Operating parameters and Configuration data. |
| 2 | Cursor Control Arrows | Controls the up, down, right and left motion of the cursor in the LCD Display window (see Figure x-x). |
| 3 | Numeric Keypad | Allows entry of numeric data and Clear and Enter function keys. |
| 4 | Operational Function LEDs | See Table 4-2 for a description of these LED Indicators. |

### 4.2.1 Front Panel LCD Display

The front panel display is a 2 line by 16-character LCD display. The display is lighted and the brightness can be set to increase when the front panel is currently in use. The LCD display automatically dims after a period of inactivity. The display has two distinct areas showing current information. The upper area shows the current parameter being monitored, such as 'Frequency' or 'Data Rate'. The lower line shows the current value of that parameter. The LCD display is a single entry window into the large matrix of parameters that can be monitored and set from the front panel.

### 4.2.2 Front Panel LED Indicators

Eight LEDs on the DM240 front panel (Refer to Table 4-2) indicate the status of the DM240's operation. The LED colors maintain a consistent meaning. Green signifies that the indication is appropriate for normal operation, Yellow means that there is a condition not proper for normal operation, and Red indicates a fault condition that will result in lost communications.

**Table 4-2.**

| LED | Color | Function |
|---|---|---|
| Transmit On | Green | Indicates the DM240 XRTransmitter is turned on. |
| Major Alarm | Red | Indicates that the transmit direction has failed, losing traffic. |
| Minor Alarm | Yellow | Indicates a transmit warning condition exists. |
| Test Mode | Yellow | Indicates the modulator is involved in a current test mode activity. |
| Power | Green | Indicates the DM240XR unit is currently powered up. |
| Fault | Red | Indicates a common fault exists such as power out of spec. |
| Event | Yellow | Indicates that events have been logged into the event buffer. |
| Remote | Green | Indicates that the unit is set to respond to the remote control or terminal input. |

### 4.2.3 Front Panel Keypad

The front panel keypad consists of two areas: a 10-key numeric entry with 2 additional keys for the 'Enter' and 'Clear' function. The second area is a set of 'Arrow' or 'Cursor' keys (↑), (↓), (→), (←), used to navigate the parameter currently being monitored or controlled. Table 4-3 describes the key functions available at the front panel.

### 4.2.4 Parameter Setup

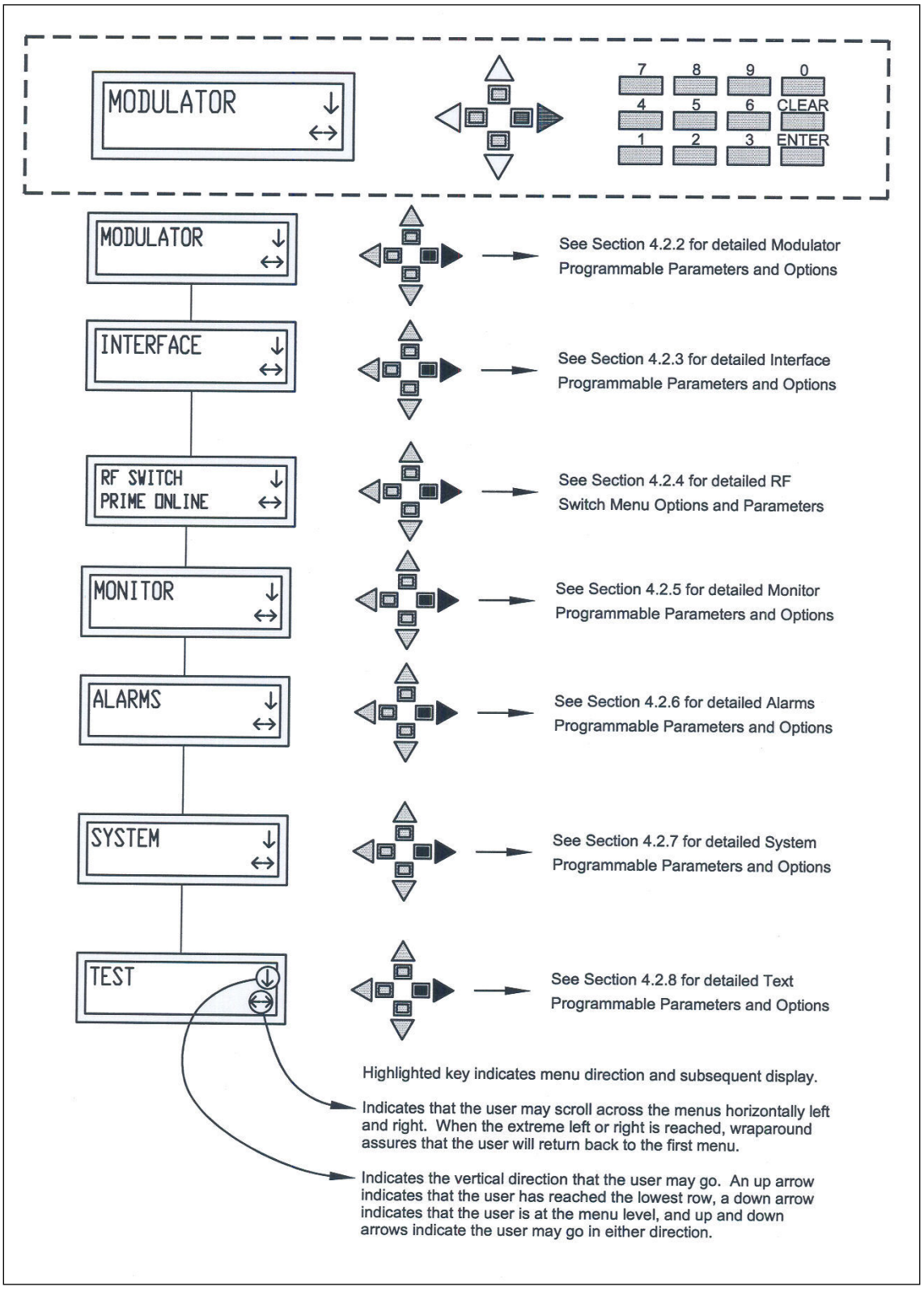
The four arrow keys (↑), (↓), (→), (←), to the right of the LCD display are used to navigate the menu tree and select the parameter to be set. After arriving at a parameter that needs to be modified, depress <ENTER>. The first space of the modifiable parameter highlights (blinks) and is ready for a new parameter to be entered. After entering the new parameter using the keypad (Refer to Figure 4-3), depress <ENTER> to lock in the new parameter. If a change needs to be made prior to pressing <ENTER>, depress <CLEAR> and the display defaults back to the original parameter. Depress <ENTER> again and re-enter the new parameters followed by <ENTER>.

Following a valid input, the DM240XR will place the new setting into the nonvolatile SRAM making it available immediately and available the next time the unit is powered-up.

**Table 4-3.**

**Edit Mode Key Functions (Front Panel Only)**

| Parameter Type | 0 – 9 | ↑ | ↓ | ← | → | 'Clear' & ← | 'Clear' & → |
|---|---|---|---|---|---|---|---|
| Fixed Point Decimal | Changes Digit | Toggles ± (If Signed) | Toggles ± (If Signed) | Moves Cursor 1 Position Left | Moves Cursor 1 Position Right | N/A | N/A |
| Unsigned Hexadecimal | Changes Digit | Increments Digit Value | Decrements Digit Value | Moves Cursor 1 Position Left | Moves Cursor 1 Position Right | N/A | N/A |
| Enumerated | N/A | Previous Value in List | Next Value in List | N/A | N/A | N/A | N/A |
| Date/ Time | Changes Digit | N/A | N/A | Moves Cursor 1 Position Left | Moves Cursor 1 Position Right | N/A | N/A |
| IP Address | Changes Digit | Increments Digit Value | Decrements Digit Value | Moves Cursor 1 Position Left | Moves Cursor 1 Position Right | N/A | N/A |
| Text Strings | Changes Character | Increments Character Value | Decrements Character Value | Moves Cursor 1 Position Left | Moves Cursor 1 Position Right | Clears to Left of Cursor Inclusive | Clears to Right of Cursor Inclusive |


MODULATOR
7 8 9 0
4 5 6 CLEAR
1 2 3 ENTER
MODULATOR
INTERFACE
RF SWITCH
PRIME ONLINE
MONITOR
ALARMS
SYSTEM
TEST
See Section 4.2.2 for detailed Modulator Programmable Parameters and Options
See Section 4.2.3 for detailed Interface Programmable Parameters and Options
See Section 4.2.4 for detailed RF Switch Menu Options and Parameters
See Section 4.2.5 for detailed Monitor Programmable Parameters and Options
See Section 4.2.6 for detailed Alarms Programmable Parameters and Options
See Section 4.2.7 for detailed System Programmable Parameters and Options
See Section 4.2.8 for detailed Text Programmable Parameters and Options
Highlighted key indicates menu direction and subsequent display.
Indicates that the user may scroll across the menus horizontally left and right. When the extreme left or right is reached, wraparound assures that the user will return back to the first menu.
Indicates the vertical direction that the user may go. An up arrow indicates that the user has reached the lowest row, a down arrow indicates that the user is at the menu level, and up and down arrows indicate the user may go in either direction.

**FFigure 4-2. DM240XR Main Programming Menu**

IMPORTANT

***If at any time the user wishes to abort the changes being made, depress <CLEAR> to begin again.***

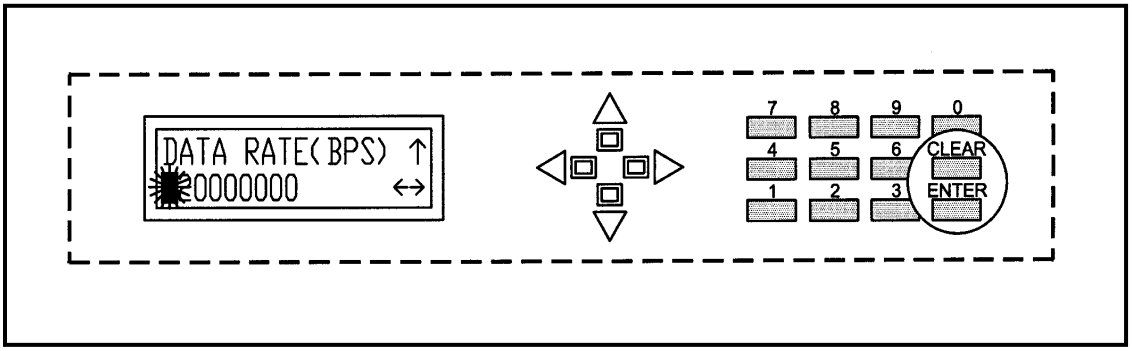



**Figure 4-3. Entering New Parameters**

## 4.3 Front Panel Control Screen Menus

IMPORTANT

***The complete set of DM240XR Front Panel Control Screens is made up of Main Menus. Each Main Menus has several Option and Parameter Screens.***

### 4.3.1 Main Menus

The Main Menus available from the Front Panel of the DM240XR are:

**MODULATOR**

**INTERFACE:** **{Manual, Redundancy}**
Allows user to select the data interface input mode.

**Manual Mode:** The user selects which interface slow will be active input.

Redundancy Mode: allows the user to place the data interfaces into data redundancy interface mode. Unit must have duplicate PIIC interfaces. User must select which data interface slot will be prime and backup input.

**RFSWITCH:** **{PRIME, BACKUP}**
**{OFFLINE, ONLINE}**
The RF Switch menu options are available only when RF Redundancy Switch (RRS11/STS11) is installed. The first status line indicates the side of the RF switch that the DM240XR is attached (prime or backup). The second status line indicates if the output of the DM240XR is the active output of the RF switch (online) or inactive (offline).

**Prime Mode**: Indicates the unit is configure as the primary modulator

**Backup Mode**: Indicates the unit is configured as the backup modulator

**Offline Mode**: Indicates the unit is in the offline state

**Online Mode**: Indicates the unit is in an online state. When unit is configured as a standalone unit, the menu will reflect "ONLINE" status.

**MONITOR**

**ALARMS**

**SYSTEM**

**TEST**

## 4.3.2 Modulator Menu Options and Parameters

**NETWORK SPEC:** **{DVB-S, DTV, DVB-S2-CCM, DVB-S2-ACM, DTV-AMC-NBC}**
Indicates the network specification to which the unit configuration adheres.

**RF ( MHz):** **Frequency Selection in 1 Hz increments:**
50 MHz to 90 MHz
100 MHz to 180 MHz
950 MHz to 2050 MHz

Displays the desired output frequency range. If user is using an L-Band platform and prefers to display the Satellite Uplink Frequency, then they can configure the following menus.

**IF ( MHz):** **{950 MHz to 2050 MHz}**
Enter the desired modem L-Band output frequency in order to display the correct RF output frequency to the satellite. Only

configure this menu when user desires to display the satellite uplink RF frequency on the RF Menu.

**LO FREQ ( MHz):** **{4000 MHz to 50000 MHz or 0 to bypass}**
Enter the LO frequency of the BUC to correctly display the RF satellite output frequency in the RF Menu. The LO Frequency must be 0 if 70/140 MHz is the desired output frequency.

**LO MIX:** **{HIGH SIDE, LOW SIDE}**
Enter location of the LO in reference to the uplink frequency

**POWER (dBm):** **Transmitter output power:**
Enter in 0.1 dBm increments from: -25.0 to 0.0 dBm

**CARRIER:** **{ON, OFF}**
Transmitter Power On/Off Control.

**MODULATION:** **{BPSK, QPSK, 8PSK, 16QAM} DVB-S**
**{QPSK, 8PSK, 16APSK, 32APSK} DVB-S2**

Modulation Type.

**INNER FEC RATE:**

| | |
|---|---|
| **DVB-S QPSK** | **1/2, 2/3, 3/4, 5/6, 7/8** |
| **DVB-S BPSK** | **1/2, 2/3, 3/4, 5/6, 7/8** |
| **DVB-S 8PSK** | **2/3, 5/6, 8/9** |
| **DVB-S 16QAM** | **3/4, 7/8** |
| **DVB-S2 QPSK** | **1/4, 1/3, 1/2, 2/5, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10** |
| **DVB-S2 8PSK** | **3/5, 2/3, 3/4, 5/6, 8/9, 9/10** |
| **DVB-S2 16APSK** | **2/3, 3/4, 4/5, 5/6, 8/9, 9/10** |
| **DVB-S2 32APSK** | **3/4, 4/5, 5/6, 8/9, 9/10** |

**SAT FRAMING** **{DVB-S2-NORMAL, DVB-S2-SHORT}**
This only appears when DVB-S2-CCM network spec is active.

**DATA RATE (BPS):** **Terrestrial Data Rate:**
Enter in 1 Bps increments from 1,000,000 to 238,000,000 BPS.

**SYMB RATE (SPS):** **Output Symbol Rate:**
Enter in 1 SPS increments from 1,000,000 to 68,000,000 Sps.

**SPECTRUM:** **{NORMAL, INVERTED}**

**ROLL OFF:** **{0.35, 0.25, 0.20}**
Changes the Spectrum Roll Off

**PILOT SYMBOLS:** **{ON, OFF}**
Physical layer pilot symbols. Displayed only in DVB-S2 related network spec.

**GOLD SEQ N:** **{0 - 262142}**
Gold code sequence index. Displayed only in DVB-S2.

**LAST RATE CTRL:** **{SYMBOL RATE, DATA RATE, AUTO}**
Indicates the rate (symbol or data) that is maintained when associated parameters (i.e. Modulation, Inner FEC Code Rate, Terr Framing) are changed. For example, if the Last Rate Control is set to "Symbol Rate" and the modulation is subsequently changed, the system will attempt to maintain the same symbol rate by adjusting the data rate. If the Last Rate Control is set to "Data Rate" and the modulation is subsequently changed, the system will attempt to maintain the same data rate by adjusting the symbol rate.

The "Auto" Setting of Last Rate Control causes the last explicitly changed rate (symbol or data) to be maintained when associated parameters are changed. For example, if the last rate control is set to "Auto" and the Data Rate is subsequently explicitly changed, any subsequent changes to Modulation or Inner FEC Rate would cause the symbol rate to be adjusted in order to maintain the Data Rate.

**EQ ENABLE:** **{Enable, Disable}**
Allows the DM240XR Modulator to implement the AutoEQ™ coefficient values as specified by the EQ Select.

**EQ SELECT:** **None, User Specified Name}**
Allows the DM240XR Modulator to select the stored AutoEQ™ coefficient file to be implemented. Up to 32 User Nameable storage locations are available.

**RXIF:** **{950 – 2050 MHz}**
Sets the receive input center frequency for the AutoEQ™ Interface Card. This programmed frequency must be within $\pm$ 25 kHz of the actual desired system downlink center frequency to insure proper acquisition.

**MSE:** **{Value}**
Displays the Mean Squared Error (MSE) value of the equalizer. A value of 1 E-5 or less indicates a successful calibration run with acceptable coefficients for operation over the satellite.

**EQ CAL:** **{Normal, Calibrating, Ref ACQ}**
Allows the DM240XR Modulator to select the AutoEQ™ interface mode of operation.

**Normal:**When in this state, the AutoEQ™ is in monitoring mode, with no Calibration or Reference Acquisition functions being preformed.

**Calibrating:** When in this state, the AutoEQ™ will program the DM240XR modulated output for the AutoEQ™ calibration

signal. The calibration output bandwidth is set by the symbol rate currently programmed into the DM240XR Modulator. During calibration, the AutoEQ™ will compute the coefficient values required to successful equalize the group delay and amplitude of the satellite link over the programmed symbol rate. During this process, the MSE can be monitored reflecting the calibration process. Upon successful completion of the calibration, the EQ CAL will revert to the "Normal" state, and the event logof the DM240XR will reflect "AutoEQ™ CAL SUCCESSFUL".

(**EQ CAL: Cont)**

**REF ACQ:** Although default reference files are provided, the operator may wish to acquire the best possible reference from their modulator. A mechanism to accomplish this is allowed by REF ACQ, this overwrites the stored default and replaces it with a new reference. Prior to entering this state, the L-Band output of the DM240XR (J11) must be connected to the AutoEQ™ RXRF Input (J12) as shown in Appendix D. The DM240XR Output power should be set to -20 dBm, and a 20 dB in line attenuator should be used. The Modulator output frequency should be set to set to the corresponding AutoEQ™ RXRF Input Frequency. When properly connected and in this state, the AutoEQ™ will program the DM240XR modulated output for the AutoEQ™ calibration signal. The calibration output bandwidth is set by the symbol rate currently programmed into the DM240XR Modulator. During reference calibration, the AutoEQ™ will obtain receive lock and establish the baseline coefficients for internal reference. References are captured for each modulator roll-off and oversample rate. During this process, the MSE can be monitored reflecting the Reference Acquisition process. Upon successful completion of the Reference Acquisition, the REF ACQ will revert to the "Normal" state, and the event log of the DM240XR will reflect "REF ACQ SUCCESSFUL".

**RESTORE EQ CAL:** **{Filename}**
Allows the selected Calibration coefficient file to be Restored.

**EQ RENAME:** **{Filename}**
Allows the Calibration coefficient file to be renamed using Alpha-numeric characters.

**EQ DELETE:** **{Filename}**
Allows the selected Calibration coefficient file to be deleted.

**EQ RECEIVER:** **{Local, Remote}**
Allows selection of Local or Remote Equalization.

### 4.3.3 Interface Menu Options and Parameters

### 4.3.3.1 Plug-In Interface Card (PIIC)

**ACTIVE INPUT:** **{SLOT 1, SLOT 2, SLOT 3}**
This menu is displayed when the interface is configured in Manual Mode. Active Input selection allows the user to select the terrestrial slot that will be active.

**PRIME INPUT:** **{SLOT 1, SLOT 2, SLOT 3}**
This menu is displayed when the interface is configured in Redundancy Mode. Prime Input selection allows the user to designate the terrestrial Prime Input in Redundancy Mode. An "(A)" indicates the active input.

**BACKUP INPUT:** **{SLOT 1, SLOT 2, SLOT 3}**
This menu is displayed in Redundancy Mode. Backup Input selection allows the user to designate the Backup Input in Redundancy Mode. An "(A)" indicates the active input.

**REDUNDANCY MODE** **{MANUAL REVERT, AUTO REVERT, FORCE PRIME, FORCE BACKUP, SEMIAUTO REVERT}**

**MANUAL REVERT -** Will switch to backup during when primary faults and not revert back until user initiates a switch back.

**AUTO REVERT -** Will switch to backup during when primary faults and automatically reverts back to the primary when primary recovers.

**SEMIAUTO REVERT -** Will switch to backup when primary faults and will not revert back until the backup faults, if primary conditions are okay.

**FORCE PRIME - Forces the Prime online**

**FORCE BACKUP - Forces the Backup online**

**INTERFACE TYPE:** **{ASI/Advanced ASI, HSSI, M2P Parallel, DVB Parallel (RS422 or LVDS), RS530/RS422 Serial, Ethernet 100/1000 Base-T, Direct TV PECL}**

Enter the Terrestrial Interface type.

***Only the Interface types that are installed may be selected. The Ethernet Interface will add additional menus that are identified in section 4.2.3.2***

**TERR FRAMING:** **DVB-S: {DVB 188, DVB 204, NONE}**
Terrestrial framing for DVB-S allows the user to choose framing packet.

DVB-S2: {DVB 188, DVB 204, NONE}
DVB-S2L {CCM uses DVB 188 or NONE}
DVB-S2: {ACM uses DVB 204}
DTV {DIRECTV}

**DATA POLARITY** **{NORMAL, INVERTED}**
Allows the data to be used as is or to be inverted.

**INCLK SRC** **{SCTE, SCT}**
Input Clock Source – Allows the user to choose between an internal (SCT) and external (SCTE) clock sources.

**INCLK POL** **{NORMAL, INVERTED}**
Input Clock Polarity – Allows the user to use the input clock signal as is or to invert it.

**OUTCLK SRC** **{"Status Only"}**
When used with G.703, the user may choose between an internal (SCT), external (SCTE), or no output clock sources. All else provides status only.

**OUTCLK POL** **{NORMAL, INVERTED}**
Output Clock Polarity – Allows the user to use the output clock signal as is or to invert it.

**REF FREQ SRC:** **{Internal, External}**
Reference Frequency Source – Allows the user to select either an internal or external reference source.

**EXT REF ( MHz):** **External Reference Frequency:**
Enter the External Reference Frequency in 8 kHz steps from 0.256 MHz to 10 MHz.

**PCR RESTAMPING:** **{ON, OFF}**
This selection is available only when the Advanced ASI Interface Type is selected. When set to "On," the DM240 will overwrite the PCR Value in appropriate packets to compensate for any Null Packets, which have been inserted into the data stream.

***The Transmit Clock (SCT) supplied by the DM240XR is always Output. Normally, this clock is used to clock the data out of the data source and then return it to the SCTE input. The DM240XR is then set to SCTE mode eliminating any possible clock skew. Alternately, the data source can generate the SCTE clock internally and the SCT signal can be ignored. If SCT mode is selected, the Modulator data clock will not be locked to the incoming data stream. This mode is NOT recommended except for testing or fault backup.***

### 4.3.3.2 Ethernet Interface (J1)

The PIIC Ethernet Data Interface (EDI) is a full duplex 100/1000 Base-T supported by an RJ45 connector. The EDI supports the input of generic UDP packets (Bridge Mode) or Pro–MPEG COP3 formatted packets. With the Pro-MPEG input, a powerful video-specific packet-based forward error correction (FEC) algorithm is also available providing a cost-effective solution for error recovery in video streams transported over public or private IP networks.

**BRIDGE MODE**

In Bridge Mode, the interface accepts all valid Ethernet packet types and sizes.

**ETHERNET DATA INTERFACE, ADDITIONAL MENUS**

When the Ethernet Data Interface is installed, it will add new menus for control and status monitoring. It is recommended that all Ethernet parameters be selected prior to placing the unit into the network.

**INTERFACE MENU -** The following new items are available under the Interface menu

**INTERFACE TYPE:** **{ETHERNET}**
When the slot with GigEth card is active, the interface type will be Ethernet.

**TERR FRAMING:** **{PROMPEG COP3, BRIDGE}**
Pro MPEG COP 3 – Terrestrial data must support Pro MPEG format or generic UDP.

Bridge – Terrestrial interface will pass data seamlessly without the need to configure an IP address.

***The following menus are only available when Terrestrial Framing is configured for PRO MPEG COP 3***

**TERR ETHERNET:** When the Terrestrial Framing is configured to PRO MPEG COP 3, additional menus will display addressable IP Addresses.

**MODE SELECT:** **{UDP PACKETS, COP 3 RTP, or COP 3 RTP FEC}**
**UDP PACKETS** - the modulator accepts generic UDP packets with seven MPEG packets encapsulated in each UDP datagram.

**COP 3 RTP -** the modulator accepts seven MPEG packets encapsulated in a COP 3 compliant RTP datagram.

**COP 3 RTP FEC**- the modulator accepts COP 3 compliant Column FEC packets in addition to the RTP datagram.

**ONLINE SELECT:** **{Prime or Backup}**
Allows selection and an indication of which UDP port is currently online. This menu selection works in conjunction with the BACKUP MODE menu. BACKUP MODE menu determines whether the unit is configured for manual mode or automatic mode. Automatic mode will switch between the prime and backup SRC until it acquires an input data stream.

**JITTER BUFFER:** **{10 TO 200ms}**
Allows the operator to select the jitter buffer depth from 10 ms to 200 ms in 10 ms steps. The Jitter Buffer is used by the modulator to smooth out the network jitter that is inherent in Ethernet networks. Entry of zero (no jitter buffer) is not allowed.

**JITTER TRACKING: {Widest, Wide, Mid Level, Narrow, Narrowest}**
Allows the operator to select how the modulator reacts to and compensates for jitter. Because the modulators transmit clock is locked to the incoming data stream, care must be taken when selecting this parameter. While wider tracking allows larger changes due to network jitter to be compensated for, it also means that the receiver will have to track larger, faster, clock rate changes as the transmit clock is adjusted. On the other hand, narrower tracking means smaller, slower, changes in the clock rate but requires more precise network timing to keep the jitter buffer from over or under flowing.

**BACKUP MODE: {Manual or Automatic)**
The Backup Mode allows the user to utilize a backup IP Address in the event the primary IP selection fails.

**Manual Mode**: When selected, the modulator will stay with the selected online port (Prime or Backup) even when it is not able to lock to the incoming data stream. User must select with Prime or Backup address in the ONLINE SELECT menu.

**Automatic Mode:** When selected, the modulator will switch between the Prime or Backup port when it is not able to lock to one or the other.

**BACKUP DELAY: {100ms TO 5 seconds}**
Allows selection of the time to delay in the event of an online source fault (prime or backup) before switching over to the other source (backup or prime). Entry is in 100 ms steps from 100 ms to 5 seconds. Displayed when backup mode is set to AUTO.

**PRIME ETHERNET:** Scroll down to configure the IP selection for the prime UDP port

**PRIME IP ADDR: {XXX.XXX.XXX.XXX}**
Allows entry of the prime IP address to be used by the Ethernet Data Interface. This will be the source IP address for all Ethernet traffic generated by this interface.

**Multicast Mode**: requires that the IP Address entries range from 224.000.000.000 to 239.255.255.255. When unit is placed in Multicast mode, it will display the Source IP Address and Unicast IP Address.

**Unicast Mode:** All IP entries outside of the Multicast IP Addresses will place the unit in Unicast mode.

**PRIME UDP PORT: {XXXXX}**
This is the destination UDP port on which packets addressed to the prime IP address will arrive.

When operating in COP3 RTP FEC mode

Prime Column FEC packets must arrive on Prime UDP port + 2

Prime Row FEC packets must arrive on Prime UDP port + 4

**SOURCE IP ADDR: {XXX.XXX.XXX.XXX}**

IMPORTANT

***This menu is displayed in when the Prime IP Address is configured for Multicast mode: The user can specify a source IP address for the prime to listen to. When a non-zero IP address is entered, the prime will only accept multicast packets addressed to it on its prime port from the specified source. When an IP address of zero is entered, the prime will accept multicast packets addressed to it on its prime port from any source.***

In Unicast mode: This field is hidden when the Prime IP Address is set for Unicast Mode. The prime accepts Unicast packets addressed to it from any source.

**UNICAST IP ADDR:** { XXX.XXX.XXX.XXX }
Identifies the Unicast IP Address

**BACKUP ETHERNET:** Scroll down to configure the IP selection for the prime UDP port

**BACKUP IP ADDR: {XXX.XXX.XXX.XXX}**

In Multicast mode: Allows the operator to enter the backup multicast IP address. The unit will only accept valid multicast IP address entries in the range of 224.000.000.000 to 239.255.255.255

In Unicast mode: This field is hidden and has no affect. The backup IP address is the same as the prime IP address

**BACKUP UDP PORT: {XXXXX}**
This is the destination UDP port on which packets addressed to the prime IP address will arrive.

When operating in COP3 RTP FEC mode:

Backup Column FEC packets must arrive on Prime UDP port + 2

Backup Row FEC packets must arrive on Prime UDP port + 4

**SOURCE IP ADDR: {XXX.XXX.XXX.XXX}**

***This menu is displayed in Multicast mode only: The user can specify a source IP address for the backup to listen to. When a non-zero IP address is entered, the backup will only accept multicast packets addressed to it on its backup port from the specified source. When an IP address of zero is entered, the backup will accept multicast packets addressed to it on its backup port from any source.***

In Unicast mode: This field is hidden and has no affect. The prime accepts Unicast packets addressed to it from any source.

**TERR MAC ADDR: {0123456789AB}**
This menu displays the MAC address of the Ethernet Data Interface card. Entering any non-zero value in this field will cause the EDI to use the entered value as its MAC address. Entering a value of all zeros will cause the Ethernet Data Interface to revert back to its original MAC address.

**MONITOR MENU -** The following status monitoring menus are available under the Monitor menu when the Ethernet Data interface is installed.

**TERR ETHERNET -** Scroll down for the Ethernet specific status

**LINK STATUS** **{Down, Unresolved, 10 Mbps Half, 100 Mbps Half, 10 Mbps Full, 100Mbps Full, 1 Gbps Half, 1Gbps Full}**
This menu displays the current terrestrial link status and rate at which the Ethernet Data Interface has established a physical connection.

**Down:** The unit is unable to establish a valid link. An unplugged cable would be one cause of this condition.

**Unresolved: Unable to agree on connection speed**

**10 Mbps Half:** The units has established a valid 10 Mbps Half Duplex link

**100 Mbps Half:** The units has established a valid 100 Mbps Half Duplex link

**10 Mbps Full:** The unit has established a valid 10 Mbps Full Duplex link

**100 Mbps Full:** The unit has established a valid 100 Mbps Full Duplex link

**1 GIG Half:** The unit has established a valid Gigabit Half Duplex link

**1 GIG Full:** The unit has established a valid Gigabit Full Duplex link

**PRIME DATA** **{No Activity, Online Activity, Offline Activity}**

**No Activity:** The prime port is not receiving any data packets

**Online Activity:** The prime port is currently the online port and it is receiving data packets

**Offline Activity:** The prime not currently the online port, but it is receiving data packets.

**PRIME COL FEC** **{Disabled, No Activity, Online Activity, Offline Activity}**

**Disabled:** FEC is not enabled (COP3 RTP FEC mode is not selected)

**No Activity:** The prime port is not receiving any column FEC packets

**Online Activity:** The prime port is currently the online port and is receiving column FEC packets

**Offline Activity:** The prime is not currently the online port, but it is receiving column FEC packets

**PRIME ROW FEC** **{Disabled, No Activity, Online Activity, Offline Activity}**

**Disabled:** FEC is not enabled (COP3 RTP FEC mode is not selected)

**No Activity:** The prime port is not receiving any row FEC packets

**Online Activity:** The prime port is currently the online port and is receiving row FEC packets

**Offline Activity:** The prime is not currently the online port, but it is receiving row FEC packets

***These menus are displayed when in COP3 Mode only.***

**BACKUP DATA** **{No Activity, Online Activity, Offline Activity}**

**No Activity:** The backup port is not receiving any data packets

**Online Activity:** The backup port is currently the online port and it is receiving data packets

**Offline Activity:** The backup not currently the online port, but it is receiving data packets.

**BACKUP COL FEC** **{No Activity, Online Activity, Offline Activity}**

**Disabled:** FEC is not enabled (COP3 RTP FEC mode is not selected)

**No Activity:** The backup port is not receiving any row FEC packets

**Online Activity:** The backup port is currently the online port and is receiving row FEC packets

**Offline Activity:** The backup is not currently the online port, but it is receiving row FEC packets

**BACKUP ROW FEC** **{No Activity, Online Activity, Offline Activity}**

**Disabled:** FEC is not enabled (COP3 RTP FEC mode is not selected)

**No Activity:** The backup port is not receiving any row FEC packets

**Online Activity:** The backup port is currently the online port and is receiving row FEC packets

**Offline Activity:** The backup is not currently the online port, but it is receiving row FEC packets

**JITTER FILL:** **{0 to 99%}**
Displays the current jitter buffer fill status

**NULL PACKETS:** **{count value}**
Displays the number of times the modulator has had to insert null packets into the modulated data stream due to a missing or erred (and not correctable) data packet.

**CORRECTED PACKETS:** **{count value}**

Indicates the number of times the modulator has had to use the FEC data stream to generate a missing or erred data packet.

**REORDERED PACKETS: {count value}**

Indicates the number of packets that have been received out of order. The modulator automatically places these packets into their correct positions in the transmit data stream.

**CLEAR STATS: {enter}**

Pressing Enter will reset the packet counters.

**ALARMS -** The following items are available under the Alarms menu

**CURRENT ALARMS -** The following new items are available under the Current Alarms menu

**TX MINOR -** The following new items are available under the Tx Minor menu

**TERR DATA ACT {Pass/Fail, Unmasked/Masked}**

Fail indicates that the EDI has not been able to establish a valid terrestrial data link. Most likely, the Ethernet cable is not plugged in.

**ONLINE DATA ACT {Pass/Fail, Unmasked/Masked}**

Fail indicates that the EDI has not been able to lock to a data stream on the online port.

**JITTER OVERFLOW {Pass/Fail, Unmasked/Masked}**

Fail indicates that the Jitter Buffer is overflowing

**JITTER UNDERFLOW {Pass/Fail, Unmasked/Masked}**

Fail indicates that the Jitter Buffer is under flowing

**LATCHED ALARMS -** The following new items are available under the Latched Alarms menu

**TX MINOR -** The following new items are available under the Tx Minor menu

**TERR DATA ACT {Pass/Fail}**

**ONLINE DATA ACT {Pass/Fail}**

**JITTER OVERFLOW {Pass/Fail}**

**JITTER UNDERFLOW {Pass/Fail}**

***These menus are displayed when in COP3 Mode only.***

### 4.3.4 RF Switch Menu Options and Parameters

**REDUNDANCY MODE:** **{MANUAL, AUTO REVERT, BACKUP}**
Indicates the mode of operation for the RF redundancy switch.

**ACTIVATE PRIME** Pressing ENTER causes the prime side of the RF switch to be selected as online.

**ACTIVATE BACKUP** Pressing ENTER causes the backup side of the RF switch to be selected as online.

**(BACKUP|PRIME) STATUS:** **{NORMAL, FAULT}**
This is the status of the other DM240XR connected to the RF switch.

**FAULT TEST:** **{NORMAL, FAULT}**
Asserts the fault signal to the RF switch for testing purposes.

### 4.3.5 Monitor Menu Options and Parameters

**EVENTS:** **Event Buff:**
Display logged events and faults.

**ERASE EVENTS:** **Clear Events:**
Clear all logged events and faults from the event buffer.

**+5V SUPPLY:** Display the currently measured +5 VDC power supply.

**+12V SUPPLY:** Display the currently measured +12 VDC power supply.

**-12V SUPPLY:** Display the currently measured -12 VDC power supply.

### 4.3.6 Alarms Menu Options and Parameters

**CURRENT ALARM (Menu):** Displays Current Alarm Status.

**TX MAJOR (Menu)**

| | ***Status*** | ***Edit Table*** |
|---|---|---|
| **OVERSAMPLE PLL:** | **{PASS/FAIL, UNMASKED/MASKED}** | |
| **FPGA CFG:** | **{PASS/FAIL, UNMASKED/MASKED}** | |
| **SYNTH PLL:** | **{PASS/FAIL, UNMASKED/MASKED}** | |

**SYSREF PLL:** **{PASS/FAIL, UNMASKED/MASKED}**

**COMPOSITE PLL:** **{PASS/FAIL, UNMASKED/MASKED}**

**SYMBOL PLL:** **{PASS/FAIL, UNMASKED/MASKED}**

**TERR INTERFACE:** **{PASS/FAIL, UNMASKED/MASKED}**

**STREAM:** **{PASS/FAIL}**

**TX MINOR (Menu)**

**TERR CLK ACT:** **{PASS/FAIL, UNMASKED/MASKED}**

**TERR DATA ACT:** **{PASS/FAIL, UNMASKED/MASKED}**

**FRAME SYNC:** **{PASS/FAIL, UNMASKED/MASKED}**

**FIFO:** **{PASS/FAIL, UNMASKED/MASKED}**

**OUTPUT LEVEL:** **{PASS/FAIL, UNMASKED/MASKED}**

**COMMON (Menu)**

**+12 VOLTS:** **{PASS/FAIL, UNMASKED/MASKED}**

**-12 VOLTS:** **{PASS/FAIL, UNMASKED/MASKED}**

**+ 5 VOLTS:** **{PASS/FAIL, UNMASKED/MASKED}**

**LATCHED ALARMS (Menu):** This menu duplicates the Current Alarm Menu, but displays Latched Alarms instead of Current Alarms.

**TX MAJOR (Menu)**

**OVERSAMPLE PLL:** **{PASS/FAIL}**

**FPGA CFG:** **{PASS/FAIL}**

**SYNTH PLL:** **{PASS/FAIL}**

**SYS REF PLL:** **{PASS/FAIL}**

**COMPOSITE PLL:** **{PASS/FAIL}**

**SYMBOL PLL:** **{PASS/FAIL}**

**TERR INTERFACE:** **{PASS/FAIL}**

**SREAM:** **{PASS/FAIL}**

**TX MINOR (Menu)**

**TERR CLK ACT:** **{PASS/FAIL}**

**TERR DATA ACT:** **{PASS/FAIL}**

**FRAME SYNC:** **{PASS/FAIL}**

**FIFO:** **{PASS/FAIL}**

**OUTPUT LEVEL:** **{PASS/FAIL}**

**COMMON (Menu)**

**+12 VOLTS:** **{PASS/FAIL}**

**-12 VOLTS:** **{PASS/FAIL}**

**+ 5 VOLTS:** **{PASS/FAIL}**

**CLEAR LATCHED:** **{((ENTER))}**
**Pressing ENTER will** clear the latched alarms.

### 4.3.7 System Menu Options and Parameters

**Date (MM/DD/YY)**

**Time (HH:MM:SS)**

**Front Panel**

**BKLT LEVEL:** **{HIGH, LOW, MED, OFF}**

**BKLT TIMEOUT:** **{01 to 99}**

**KEYCLICK:** **{ON, OFF}**

**MENU NAVIGATION {STANDARD, FLOATING}**

**TERMINAL (menu)**

**TYPE: {VT100, VIEWPOINT, WYSE50}**

**BAUD RATE:** **{1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200}**
Allows the user to select the Terminal Baud Rate.

**Remote Port (Menu)**

**ADDRESS:** Multi-Drop Address: Enter the address for computer control from 32 to 255.

**BAUD RATE:** **{150, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 115200}**
Allows the user to select the Computer Baud Rate.

**TCP/IP (menu)**

**BOOTp SERVER** **TAG: {128 – 257, default is 206}**
Only used if Bootp is selected in Boot Mode. Should be consistent with the tag expected by the users Bootp Server.

**BOOT MODE** **{DEFAULT, NON-VOL, BOOTP, IP TEST}**

**DEFAULT:** During initialization (boot up), the modem will restore the web setting to the standard IP Mask and addresses supplied by the modem. The modem will be taken off the network and will not be accessible. The Default settings are:

| | | |
|---|---|---|
| IP Address Mask: | 255.000.000.000 | (FF.00.00.00 hex) |
| Modem IP Address: | 010.000.000.001 | (C0.A8.00.EE hex) |
| Server IP Address: | 010.001.001.001 | (0A.01.01.01 hex) |
| Router IP Address: | 010.000.001.001 | (0A.00.01.01 hex) |

**BOOTP:** During initialization (boot up), the modem will get the names, masks, and IP Addresses of the modem, router, and server.

**NON-VOL:** Stores and uses IP Mask and addresses as provided by the user.

**IP TEST:** Stores and uses IP Mask and addresses to fixed settings as listed below.

| | | |
|---|---|---|
| Bootp Server Tag: | 206 | |
| IP Address Mask: | 255.255.255.000 | (FF.FF.FF.00 hex) |
| Modem IP Address: | 192.168.0.238 | (C0.A8.00.EE) |
| Server IP Address: | 192.168.000.101 | (C0.A8.00.65) |
| Router IP Address: | 192.168.000.102 | (C0.A8.00.66) |

**MODEM HOST** Displays the Host Modem for the network.

**IP ADDR MASK** **{XX.XX.XX.XX} Hexidecimal Mask**
**{ddd.ddd.ddd.ddd} Decimal Mask**
The IP Address Mask of the local network. The mask is expressed in a hexadecimal format, and must be a valid TCP/IP Mask. This field should be set before changes are made to the Modem or Router Address.

**MODEM IP ADDR** **{XX.XX.XX.XX} Hexidecimal Address**
**{ddd.ddd.ddd.ddd} Decimal Address**
The IP Address of the modem. This address should be consistent for the mask defined. This address is expressed in hexadecimal format. Broadcast and loop back addresses will not be allowed. These are addresses with all subnet bits set to 0's or 1's.

**ROUTER IP ADDR** **{XX.XX.XX.XX} Hexidecimal Address**
**{ddd.ddd.ddd.ddd} Decimal Address**
The IP Address of the Local Network Router. If a router is present on the local network, this address must be consistent with the IP Mask and the subnet of the modem. If no router is present, then the address should be set to a foreign address. This address is expressed in hexadecimal format.

Broadcast and loop back addresses will not be allowed. These are addresses with all subnet bits set to 0's or 1's.

**SERVER IP ADDR** **{XX.XX.XX.XX} Hexidecimal Address**
**{ddd.ddd.ddd.ddd} Decimal Address**
The IP Address of the Boot Server and the address of the SNMP Trap Server when SNMP is active. If a server is used and there is no local router, this address must be consistent with the modem address. If a router has been specified, the address is presumed to be reachable via the router. Broadcast and loop back addresses will not be allowed. These are addresses with all subnet bits set to 0's or 1's.

***To change the display from Decimal to Hexidecimal on the IP ADDRESS MASK, MODEM IP ADDRESS, SERVER IP ADDRESS, AND ROUTER IP ADDRESS menus, press all four arrow keys simultaneously.***

**MODEM EADDR** **{001065010000}**
Displays the Ethernet address of the device. Set at the factory and is a unique identifier for the Ethernet physical interface.

**ETHER RATE** **{10 MBPS/HD, 10 MBPS/FD, AUTO NEGOTIATE, 100 MBPS/FD, 100 MBPS/HD}**
The data rate for the local Ethernet Interface.
10 Mbps/HD: 10 Base-T half-duplex
10 Mbps/FD: 10 Base-T full duplex.

**SNMP (menu)** A description of OID organization is provided in the MIB portion of this manual (Appendix C).

**SNMP VERSION** **{V1 & V2, V3}**
This selection controls the SNMP Version that will be used in messaging between the equipment and it's host.

When V1 & V2 is used, RD COMMUNITY and RDWR COMMUNITY are used to determine the authorization of an incoming message.

When V3 is used, three contexts are supported: ***public***, ***mib2***, and ***dev***. Context, Authentication and Privacy are a portion of each SNMPV3 message.

The ***public*** context will only allow the user to see the sysoid of the unit. This is the most restricted access possible and only allows the unit to be identified by a host SNMP Station.

The ***mib2*** context allows a user with appropriate authentication to access the mib2 OIDs and the SNMP OIDs. These are of interest primarily to network operators not controlling the satellite link.

The ***dev*** context allows a user with appropriate authentication to access the device control portion of the MIB. These OIDs are used to control the devices satellite link and operation.

**TRAP VERSION** **{V1, V2}**
This controls the type of message format used when a message trap is generated by the equipment and bound for a SNMP Host. Messages will only be sent if the unit has been authorized to do so.

**AUTHORIZATION** **{TRAPS OFF, TRAPS ON}**
This controls the type of message format used when a message trap is generated by the equipment and bound for a SNMP host. Messages will only be sent if the unit has been authorized to do so.

**RD COMMUNITY** **{16 characters of name}**
This menu is only displayed when SNMP VERSION is set to V1 & V2.

This is the community that a host must be acting within when an OID variable is requested by a V1/V2 SNMP message.

**RDWR COMMUNITY** **{16 characters of name}**
This menu is only displayed when SNMP VERSION is set to V1 & V2.

This is the community that a host must be acting within when an OID variable is being changed by a V1/V2 SNMP message.

**WEB (Menu)**

**CONFIRMATION** **{ENABLE, DISABLE}**

**USER 1** **{xxxxxxxx}**
User to select user name. The user can modify the user names. The user name can have up to 14 characters supporting alpha and

numeric characters. Alpha characters can be entered using the up and down arrow keys. Numeric characters can be selected by using the number keys on the front panel. The user can clear all characters from the front panel screen.

**ACCESS GROUP {NO GROUP, GUEST, OPER, ADMIN}**

Access rights represent the following:

**No Group:** Denies Access

**Guest:** Users are able to navigate most of the site, and view modem parameter settings.

**Oper:** Users can monitor and control parameter settings, and change their own authentication passwords.

**Admin:** At this highest access right, the users can monitor and control the modems parameters, change any user's name and authentication password, and modify IP network settings. Admin setting allows access to the entire site.

**AUTH PASSWORD {xxxxxxxx}**

User to select password. The user can modify the Authorization Passwords. The user password can have up to 14 characters supporting alpha and numeric characters. Alpha characters can be entered using the up and down arrow keys. Numeric characters can be selected by using the number keys on the front panel. The user can clear all characters from the front panel screen.

**USER RESET** Resets group and password.

**USER 2 {xxxxxxxx}**

User to select user name. The user can modify the user names. The user name can have up to 14 characters supporting alpha and numeric characters. Alpha characters can be entered using the up and down arrow keys. Numeric characters can be selected by using the number keys on the front panel. The user can clear all characters from the front panel screen.

**ACCESS GROUP {NO GROUP, GUEST, OPER, ADMIN}**

Access rights represent the following:

**No Group:** Denies Access

**Guest:** Users are able to navigate most of the site, and view modem parameter settings.

**Oper:** Users can monitor and control parameter settings, and change their own authentication passwords.

**Admin:** At this highest access right, the users can monitor and control the modems parameters, change any user's name and authentication password, and modify IP network settings. Admin setting allows access to the entire site.

**AUTH PASSWORD {xxxxxxxx}**

User to select password. The user can modify the Authorization Passwords. The user password can have up to 14 characters supporting alpha and numeric characters. Alpha characters can be entered using the up and down arrow keys. Numeric characters can be selected by using the number keys on the front panel. The user can clear all characters from the front panel screen.

**USER RESET** Resets group and password.

**USER 3 {xxxxxxxx}**

User to select user name. The user can modify the user names. The user name can have up to 14 characters supporting alpha and numeric characters. Alpha characters can be entered using the up and down arrow keys. Numeric characters can be selected by using the number keys on the front panel. The user can clear all characters from the front panel screen.

**ACCESS GROUP {NO GROUP, GUEST, OPER, ADMIN}**

Access rights represent the following:

**No Group:** Denies Access

**Guest:** Users are able to navigate most of the site, and view modem parameter settings.

**Oper:** Users can monitor and control parameter settings, and change their own authentication passwords.

**Admin:** At this highest access right, the users can monitor and control the modems parameters, change any user's name and authentication password, and modify IP network settings. Admin setting allows access to the entire site.

**AUTH PASSWORD {xxxxxxxx}**

User to select password. The user can modify the Authorization Passwords. The user password can have up to 14 characters supporting alpha and numeric characters. Alpha characters can be entered using the up and down arrow keys. Numeric characters can be selected by using the number keys on the front panel. The user can clear all characters from the front panel screen.

**USER RESET** Resets group and password.

**FTP (menu)**

**PORT:** **{XXXX}**
**FTP Port number must be set the same value on DM240XR and FTP program**

**USER ID:** **{xxxxxxxx}**
User to select USER ID. The user can modify the user ID. The user ID can have up to 14 characters supporting alpha and numeric characters. Alpha characters can be entered using the up and down arrow keys. Numeric characters can be selected by using the number keys on the front panel. The user can clear all characters from the front panel screen.

**PASSWORD:** **{xxxxxxxx}**
User to select PASSWORD ID. The user can modify the PASSWORD. The password can have up to 14 characters supporting alpha and numeric characters. Alpha characters can be entered using the up and down arrow keys. Numeric characters can be selected by using the number keys on the front panel. The user can clear all characters from the front panel screen.

**BACK CHANNEL (menu)** The Auto EQ Back Channel menu is used to support remote equalization with the AutoEQ system, the equalization data is transported over TCP/IP using a backchannel protocol. Before setting up the backchannel, perform the TCP/IP Ethernet setup as outlined in Appendix B of the user manual. This document is to be used only as a guideline for setting up the backchannel menus. Contact the Network administrator for proper guidance and support to ensure setup is successful.

**LOCAL PORT:** **{XXXX}**
The local port number must be set to the same value at both the local and remote sites.

**SERVER PORT:** **{XXXX}**
The server port number must be set to the same value at both the local and remote sites.

***Note: The local port and server port values must be different from the local and remote sites.***

**SERVER IP ADDR:** **{XXX.XXX.XXX.XXX} Hexidecimal Address**
**{ddd.ddd.ddd.ddd} Decimal Address**

On the local unit, this should have the value of the remote unit's IP address.

***Note: If the remote IP address is not publicly accessible then its translated NAT(Network Address Translation) needs to be applied.***

**RECEIVE TIMEOUT: {X.X MINUTES}**
This value is factory set, and should only be adjusted as directed by your Network administrator or Radyne Customer Service.

**REPLY TIMEOUT: {XX secs}**
This value is factory set, and should only be adjusted as directed by your Network administrator or Radyne Customer Service.

**STREAM ALARM PER: {0 to 59 secs}**
**A setting of "0" indicates that there will be no major alarm set on loss of input data**
**A setting of 1 to 59 seconds will enable TX Major Alarm "STREAM" on loss of input data once the number of seconds has passed and the alarm criteria exist without clearing.**

**HW/FW CONFIG (menu)**

**DM240: {NORMAL, DEMO}**
Displays the DM240XR feature status

**FIRMWARE REV: {"Status Only"}**
Displays the Firmware revision level.

**M&C REV: {"Status Only"}**
Displays the Monitor and Control revision level.

**MAIN BOARD: {sub-menu}**

**SERIAL NUMBER: {"Status Only"}**

**PC NUMBER: {"Status Only"}**

**ASSEMBLY #: {"Status Only"}**

**FEATURES: {sub-menu}**

**xxxx.xxxx.xxxx Unique Feature Code ID**

**UDGRADE LIST (sub menu) List Features Status**

**INTFC 1 TYPE: {"Status Only"}**
Displays interface type installed in slot 1

**INTFC 1 REV {"Status Only"}**
Displays FPGA REV of interface in slot 1

**INTFC 2 TYPE: {"Status Only"}**
Displays interface type installed in slot 2

**INTFC 2 REV {"Status Only"}**
Displays FPGA REV of interface in slot 2

**INTFC 3 TYPE:** **{"Status Only"}**
Displays interface type installed in slot 3

**INTFC 3 REV** **{"Status Only"}**
Displays FPGA REV of interface in slot 3

### 4.3.8 Test Menu Options and Parameters

**CARRIER TYPE:** **{NORMAL, CW, DUAL, OFFSET, POS.FIR, NEG.FIR}**
Sets carrier test modes.

**OUTER FEC:** **{NORMAL, BYPASS}**

**INNER FEC:** **{NORMAL, BYPASS}**

**INTERLEAVER:** **{NORMAL, BYPASS}**
Enables Interleaver.

**BB SCRAMBLER:** **{NORMAL, BYPASS}**
Enables Baseband Scrambler for Energy Dispersal.

**PL SCRAMBLER:** **{NORMAL, BYPASS}**
Enables Physical Layer Scrambler for Energy Dispersal.

**TEST PATTERN:** **{NONE, $2^{15}$-1, $2^{23}$-1}**
Enables Test Pattern Generator. Inserts a test pattern in the data stream before the scrambler.

**PING TEST:** **{NONE, BOOTp SERVER, BK CHAN SERVER, TCP/IP ROUTER, ALL}**
Sends a ping to selected IP address via J6 Ethernet port, once completed will revert to NONE. If ping test fails an event will be generated.

**BACK CHAN TEST** **((ENTER))**
Tests the connection with the Back Channel.
For more information see Appendix D, AutoEQ™

## 4.4 Remote Port User Interface

The Remote Port of the DM240XR allows for complete control and monitor functions via an RS-485 Serial Interface.

Control and status messages are conveyed between the DM240XR and the subsidiary modems, and the host computer using packetized message blocks in accordance with a proprietary communications specification. This communication is handled by the Radyne Link Level Protocol (RLLP), which serves as a protocol 'wrapper' for the M&C data.

Complete information on monitor and control software is contained in the following sections.

### 4.4.1 Protocol Structure

The Communications Specification (COMMSPEC) defines the interaction of computer resident Monitor and Control software used in satellite earth station equipment such as modems, redundancy switches, multiplexers, and other ancillary support gear. Communication is bi-directional, and is normally established on one or more full-duplex multi-drop control buses that conform to EIA Standard RS-485.

Each piece of earth station equipment on a control bus has a unique physical address, which is assigned during station setup/configuration or prior to shipment. Valid decimal addresses on one control bus range from 032 through 255 for a total of up to 224 devices per bus. Address 255 of each control bus is usually reserved for the M&C computer.

### 4.4.2 Protocol Wrapper

The Radyne COMMSPEC is byte-oriented, with the Least Significant Bit (LSB) issued first. Each data byte is conveyed as mark/space information with two marks comprising the stop data. When the last byte of data is transmitted, a hold comprises one steady mark (the last stop bit). To begin or resume data transfer, a space substitutes this mark. This handling scheme is controlled by the hardware and is transparent to the user. A pictorial representation of the data and its surrounding overhead may be shown as follows:

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S1 | S2 | $B_0$ | $B_1$ | $B_2$ | $B_3$ | $B_4$ | $B_5$ | $B_6$ | $B_7$ | S1 | S2, etc. |

The stop bits, S1 and S2, are each a mark. Data flow remains in a hold mode until S2 is replaced by a space. If S2 is followed by a space, it is considered a start bit for the data byte and not part of the actual data ($B_0$ - $B_7$).

The COMMSPEC developed for use with the Radyne Link Level Protocol (RLLP) organizes the actual monitor and control data within a shell, or "protocol wrapper" that surrounds the data. The format and structure of the COMMSPEC message exchanges are described herein. Decimal numbers have no suffix; hexadecimal numbers end with a lower case h suffix and binary values have a lower case b suffix. Thus, 22 = 16h = 000010110b. The principal elements of a data frame, in order of occurrence, are summarized as follows:

**<SYN>** - the message format header character, or ASCII sync character, that defines the beginning of a message. The <SYN> character value is always 16h.

**<BYTE COUNT>** - the Byte Count is the number of bytes in the <DATA> field, ranging from 0 through TBD. This field is 2 bytes long for the DM240 protocol.

**<SOURCE ID>** - the Source Identifier defines the message originator's multidrop address.

***All nodes on a given control bus have a unique address that must be defined.***

**<DESTINATION ID>** - The Destination Identifier specifies the multidrop address of the device(s) to which the message is sent.

**<FRAME SEQUENCE NUMBER>** - The FSN is a tag with a value from 0 through 255 that is sent with each message. It assures sequential information framing and correct equipment acknowledgment and data transfers.

**<OPCODE>** - The Operation Code field contains a number that identifies the message type associated with the data that follows it. Acknowledgment and error codes are returned in this field. This field is 2 Bytes for the DM240 protocol.

**<...DATA...>** - The Data field contains the binary, data bytes associated with the <OPCODE>. The number of data bytes in this field is indicated by the <BYTE COUNT> value.

**<CHECKSUM>** - The checksum is the modulo 256 sum of all preceding message bytes, excluding the <SYN> character. The checksum determines the presence or absence of errors within the message. In a message block with the following parameters, the checksum is computed as shown below in Table 4-4.

| Table 4-4. Checksum Calculation Example | | |
|---|---|---|
| **BYTE FIELD** | **DATA CONTENT** | **RUNNING CHECKSUM** |
| <BYTE COUNT> (Byte 1) | 00h = 00000000b | 00000000b |
| <BYTE COUNT> (Byte 2) | 02h = 00000010b | 00000010b |
| <SOURCEID> | F0h = 11110000b | 11110010b |
| <DESTINATION ID> | 2Ah = 00101010b | 00011100b |
| <FSN> | 09h = 00001001b | 00100101b |
| <OPCODE> (Byte 1) | 00h = 00000000b | 00101000b |
| <OPCODE> (Byte 2) | 03h = 00000011b | 00101000b |
| <DATA> (Byte 1) | DFh = 11011111b | 00000111b |
| <DATA> (Byte 2) | FEh = 11111110b | 00000101b |

Thus, the checksum is 00000101b; which is 05h or 5 decimal. Alternative methods of calculating the checksum for the same message frame are:

00h + 02h + F0h + 2Ah + 09h + 00h + 03h + DFh + FEh = 305h.

Since the only concern is the modulo 256 (modulo 100h) equivalent (values that can be represented by a single 8-bit byte), the checksum is 05h.

For a decimal checksum calculation, the equivalent values for each information field are:

0 + 2 + 240 + 42 + 9 + 0 + 3 + 223 + 254 = 773;

773/256 = 3 with a remainder of 5. This remainder is the checksum for the frame.

5 (decimal) = 05h = 0101b = <CHECKSUM>

### 4.4.3 Frame Description and Bus Handshaking

In a Monitor and Control environment, every message frame on a control bus port executes as a packet in a loop beginning with a wait-for-SYN-character mode. The remaining message format header information is then loaded, either by the M&C computer or by a subordinate piece of equipment requesting access to the bus. Data is processed in accordance with the OPCODE, and the checksum for the frame is calculated. If the anticipated checksum does not match then the wait-for-SYN mode goes back into effect. If the OPCODE resides within a command message, it defines the class of action that denotes an instruction that is specific to the device type, and is a prefix to the DATA field if data is required. If the OPCODE resides within a query message packet, then it defines the query code, and can serve as a prefix to query code DATA.

The Frame Sequence Number (FSN) is included in every message packet, and increments sequentially. When the M & C computer or bus-linked equipment initiates a message, it assigns the FSN as a tag for error control and handshaking. A different FSN is produced for each new message from the FSN originator to a specific device on the control bus. If a command packet is sent and not received at its intended destination, then an appropriate response message is not received by the packet originator. The original command packet is then re-transmitted with the same FSN. If the repeated message is received correctly at this point, it is considered a new message and is executed and acknowledged as such.

If the command packet is received at its intended destination but the response message (acknowledgment) is lost, then the message originator (usually the M&C computer) re-transmits the original command packet with the same FSN. The destination device detects the same FSN and recognizes that the message is a duplicate, so the associated commands within the packet are not executed a second time. However, the response packet is again sent back to the source as an acknowledgment in order to preclude undesired multiple executions of the same command.

To reiterate, valid equipment responses to a message require the FSN tag in the command packet. This serves as part of the handshake/acknowledge routine. If a valid response message is absent, then the command is re-transmitted with the same FSN. For a repeat of the same command involving iterative processes (such as increasing or decreasing transmit power level), the FSN is incremented after each message packet. When the FSN value reaches 255, it overflows and begins again at zero.

The full handshake/acknowledgment involves a reversal of source and destination ID codes in the next message frame, followed by a response code in the <OPCODE> field of the message packet from the equipment under control.

### 4.4.4 Global Response Operational Codes

In acknowledgment (response) packets, the operational code <OPCODE> field of the message packet is set to 0 by the receiving devices when the message intended for the device is evaluated as valid. The device that receives the valid message then exchanges the <SOURCE ID> with the <DESTINATION ID>, sets the <OPCODE> to zero in order to indicate that a good message was received, and returns the packet to the originator. This "GOOD MESSAGE" Opcode is one of nine global responses. Global response Opcodes are common responses, issued to the M&C computer or to another device that can originate from and are interpreted by all Radyne equipment in the same manner. These are summarized as follows:

| RESPONSE OPCODE DESCRIPTION | OPCODE |
|---|---|
| Good Message | 0000h |
| Bad Parameter | 00FFh |
| Bad Opcode | 00FEh |
| IF Frequency Error | 0401h |
| Data Rate Error | 0404h |
| External Reference Error | 0406h |
| Frequency Reference Source Error | 0407h |
| Modulation Type Error | 0408h |
| Inner FEC Rate Error | 0409h |
| Outer FEC Bypass Error | 040Ah |
| Scrambler Bypass Error | 040Bh |
| Transmit Power Level Error | 0410h |
| Carrier Control Error | 0411h |
| Carrier Type Error | 0412h |
| Spectrum Error | 0413h |
| Input/Output Clock Source Error | 0417h |
| Input Clock Polarity Error | 0418h |
| Network Spec Error | 0422h |
| Tx Interface Type Error | 0429h |
| Symbol Rate Error | 042Ch |
| Data Polarity Error | 042Eh |
| Terrestrial Framing Error | 0450h |
| Roll Off Error | 0451h |
| Time Error | 0A01h |
| Date Error | 0A02h |

### 4.4.5 Collision Avoidance

When properly implemented, the physical and logical devices and ID addressing scheme of the COMMSPEC normally precludes message packet contention on the control bus. The importance of designating unique IDs for each device during station configuration cannot be overemphasized. One pitfall, which is often overlooked, concerns multi-drop override IDs.

All too often, multiple devices of the same type are assigned in a direct-linked ("single-thread") configuration accessible to the M&C computer directly. For example, if two DM240 Modulators with different addresses (DESTINATION IDs) are linked to the same control bus at the same hierarchical level, both will attempt to respond to the M&C computer when the computer generates a multi-drop override ID of 23. If their actual setup parameters, status, or internal timing differs, they will both attempt to respond to the override simultaneously with different information, or asynchronously in their respective message packets and response packets, causing a collision on the serial control bus.

To preclude control bus data contention, different IDs must always be assigned to the equipment. If two or more devices are configured for direct-linked operation, then the M&C computer and all other devices configured in the same manner must be programmed to inhibit broadcast of the corresponding multi-drop override ID.

The multi-drop override ID is always accepted by devices of the same type on a common control bus, independent of the actual DESTINATION ID. These override IDs with the exception of “BROADCAST” are responded to by all directly linked devices of the same type causing contention on the bus. The “BROADCAST” ID, on the other hand, is accepted by all equipment but none of them returns a response packet to the remote M&C. The following multi-drop override IDs are device-type specific, with the exception of "BROADCAST". These are summarized below with ID values expressed in decimal notation:

| Directly-Addressed Equipment | Multi-Drop Override ID |
|---|---|
| Broadcast (all directly-linked devices) | 00 |
| DMD-3000/4000, 4500 or 5000 Mod Section, DMD15 | 01 |
| DMD-3000/4000, 4500 or 5000 Demod Section, DMD15 | 02 |
| RCU-340 1:1 Switch | 03 |
| RCS-780 1:N Switch | 04 |
| RMUX-340 Cross-Connect Multiplexer | 05 |
| CDS-780 Clock Distribution System | 06 |
| SOM-340 Second Order Multiplexer | 07 |
| DMD-4500/5000 Modulator Section | 08 |
| DMD-4500/5000 Demodulator Section | 09 |
| RCU-5000 M:N Switch | 10 |
| DMD15 Modulator | 20 |
| DMD15 Demodulator | 21 |

| | |
|---|---|
| DMD15 Modem | 22 |
| DVB3030 Video Modulator, DM240 | 23 |
| Reserved for future equipment types | 24-31 |

***Multi-drop override ID 01 can be used interchangeably to broadcast a message to a DMD-3000/4000 modem, a DMD-4500/5000, a DMD15 modem, or a DVB3030. Radyne Corp. recommends that the multi-drop override IDs be issued only during system configuration as a bus test tool by experienced programmers, and that they not be included in run-time software. It is also advantageous to consider the use of multiple bus systems where warranted by a moderate to large equipment complement.***

Therefore, if a DMD15 Modulator is queried for its equipment type identifier, it will return a "20" and DMD15 Demodulator will return a "21". A DMD15 Modem will also return an "22". A DVB3030 Video Modulator will return a “23.”

### 4.4.6 Software Compatibility

The COMMSPEC, operating in conjunction within the RLLP shell, provides for full forward and backward software compatibility independent of the software version in use. New features are appended to the end of the DATA field without OPCODE changes. Older software simply discards the data as extraneous information without functional impairment for backward compatibility.

If new device-resident or M&C software receives a message related to an old software version, new information and processes are not damaged or affected by the omission of data.

The implementation of forward and backward software compatibility often, but not always, requires the addition of new Opcodes. Each new function requires a new Opcode assignment if forward and backward compatibility cannot be attained by other means.

When Radyne equipment is queried for bulk information (Query Mod, Query Demod, etc.) it responds by sending back two blocks of data; a Non-Volatile Section (parameters that can be modified by the user) and a Volatile Section (status information). It also returns a count value that indicates how large the Non-Volatile Section is. This count is used by M&C developers to index into the start of the Volatile Section.

When new features are added to Radyne equipment, the control parameters are appended to the end of the Non-Volatile Section, and status of the features, if any, are added at the end of the Volatile Section. If a remote M&C queries two pieces of Radyne equipment with different revision software, they may respond with two different sized packets. The remote M&C **must** make use of the non-volatile count value to index to the start of the Volatile Section. If the remote M&C is not aware of the newly added features to the Radyne product, it should disregard the parameters at the end of the Non-Volatile Section and index to the start of the Volatile Section.

If packets are handled in this fashion, there will also be backward-compatibility between Radyne equipment and M&C systems. Remote M&C systems need not be modified every time a feature is added unless the user needs access to that feature.

### 4.4.7 RLLP Summary

The RLLP is a simple send-and-wait protocol that automatically re-transmits a packet when an error is detected, or when an acknowledgment (response) packet is absent.

During transmission, the protocol wrapper surrounds the actual data to form information packets. Each transmitted packet is subject to time out and frame sequence control parameters, after which the packet sender waits for the receiver to convey its response. Once a receiver verifies that a packet sent to it is in the correct sequence relative to the previously received packet, it computes a local checksum on all information within the packet excluding the <SYN> character and the <CHECKSUM> fields. If this checksum matches the packet <CHECKSUM>, the receiver processes the packet and responds to the packet sender with a valid response (acknowledgment) packet.

The response packet is therefore either an acknowledgment that the message was received correctly. If the sender receives a valid acknowledgment (response) packet from the receiver, the <FSN> increments and the next packet is transmitted as required by the sender.

If an acknowledgment (response) packet is lost, corrupted, or not issued due to an error and is thereby not returned to the sender, the sender re-transmits the original information packet; but with the same <FSN>. When the intended receiver detects a duplicate packet, the packet is acknowledged with a response packet and internally discarded to preclude undesired repetitive executions. If the M&C computer sends a command packet and the corresponding response packet is lost due to a system or internal error, the computer times out and re-transmits the same command packet with the same <FSN> to the same receiver and waits once again for an acknowledgment.

### 4.4.8 DM240XR Opcode Command Set

***Refer to Section 9 for Modem Remote Communications.***

## 4.5 Ethernet Port User Interface

The Ethernet Port of the DM240XR allows for complete control and monitoring of all DM240XR parameters and functions via a 10 Base-T or 100 Base-T Ethernet Connection.

## 4.6 Simple Network Management Protocol (SNMP)

Simple Network Management Protocol (SNMP), as its name suggests, is a relatively simple protocol by which management information for a network device may be inspected and/or altered by remote administrators. Refer to section 8 MIB Protocol

## 4.7 The Management Information Base (MIB)

***Refer to Section 8 MIB Protocol***

Management objects are defined in the Management Information Base (MIB), which uses a hierarchical naming scheme. Within this scheme, each object is identified by an Object Identifier (OID), a sequence of non-negative integers that uniquely describes the path taken through the hierarchical structure.

MIB objects may then be specified either from the Root (which has no designator), or alternatively from anywhere within the hierarchical structure.

For example: 1.3.6.1.4.1.2591.4 is equivalent to {iso(1). org(3). dod(6). internet(1). private(4). enterprises(1). Radyne(2591). RCS10L(4)} (See Figure 4-4a and 4-4b).

In general, we are mainly concerned with just two groups that reside in the *internet* subtree, namely the *mgmt*, and *private* groups. For completeness however, the four major groups are discussed below:

### 4.7.1 Directory {internet 1} 1.3.6.1.1

This area was reserved to describe how the OSI directory structure may be used in the Internet. To date this has not been implemented and therefore is of little interest to us.

### 4.7.2 Mgmt {internet 2} 1.3.6.1.2

This area was reserved to describe objects in the standard MIB. As RFCs defining new groups are ratified, the Internet Assigned Numbers Authority (IANA) assigns new group IDs.

### 4.7.3 Experimental {internet 3} 1.3.6.1.3

This subtree provides an area where experimentation is carried out. Only those organizations directly involved in the experiment have any interest in this subtree.

### 4.7.4 Private {internet 4} 1.3.6.1.4

This is possible the most important area of the MIB, since it is within this subtree that vendors place objects specific to their particular devices. Beneath the private branch, there is a subtree called enterprises, beneath which each vendor may define its own structure. Vendors are assigned Private Enterprise Numbers (PENs) that uniquely identify them. They may then place all objects specific to their devices in this tree, provided of course that the object conforms to the format defined by SMI. Radyne Corporation's Private Enterprise Number is 2591. Other products are added to Radyne Corporation's subtree as they become remotely manageable through SNMP.

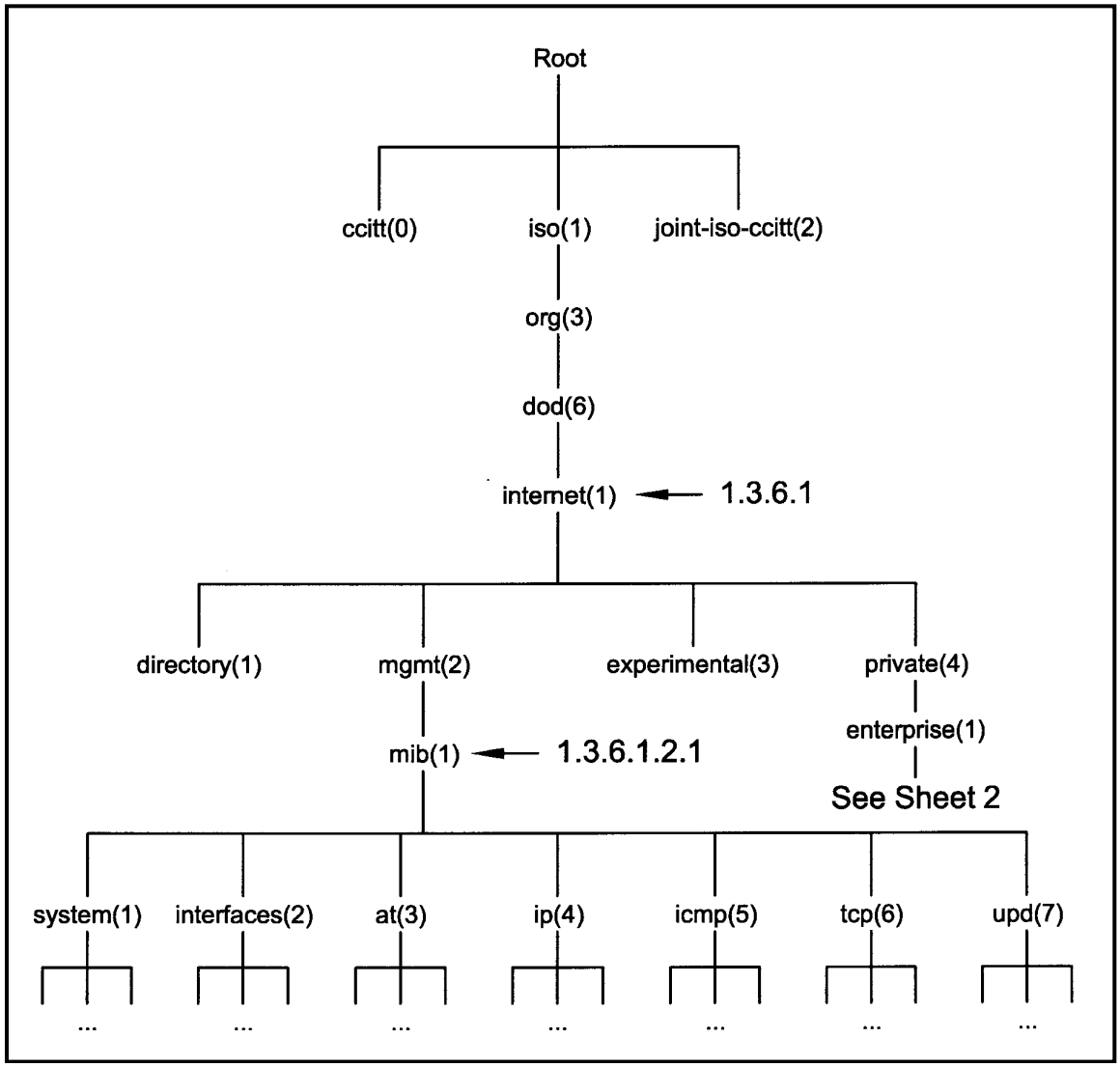



**Figure 4-4a. Object Identifiers in the Management Information Base (Figure 1 of 2)**

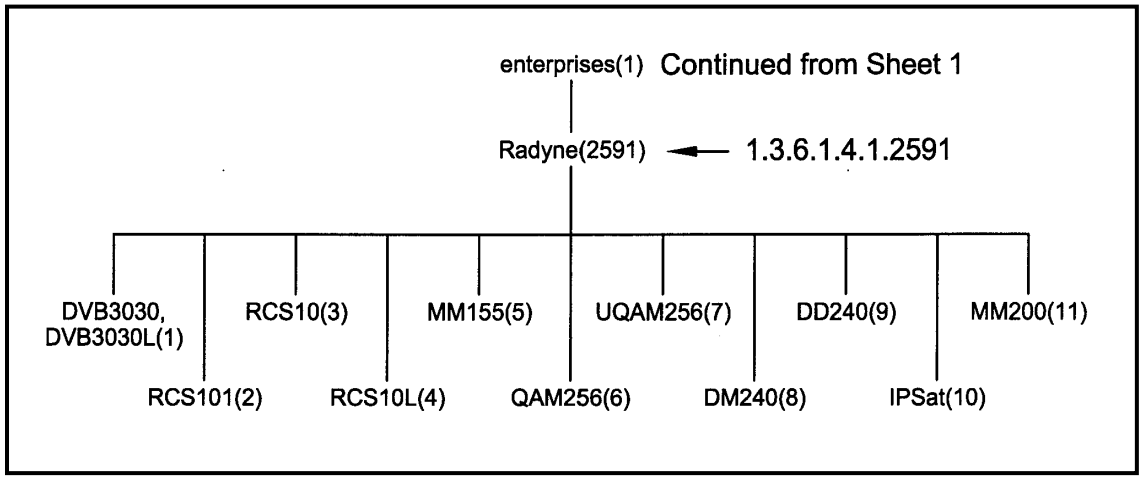



**Figure 4-4b. Object Identifiers in the Management Information Base (Figure 2 of 2)**

## 4.8 Terminal Port User Interface

The Terminal Port of the DM240XR supports an asynchronous control protocol. It is configured to support RS-232 signal levels. This port is intended for use in computer-based remote M&C. All functions of the modem may be monitored and controlled from this port via a common terminal connected to the Terminal Port.

The Terminal Mode Control allows the use of an external terminal or computer to monitor and control the modem from a full screen interactive presentation operated by the modem itself. No external software is required other than VT-100 Terminal Emulation Software (e.g. “Procomm” for a computer when used as a terminal. The Control Port is normally used as an RS–232 Connection to the terminal device. The RS-232 operating parameters can be set using the modem Front Panel and stored in Non-volatile memory for future use. Terminal mode communications and protocol is set from the front panel control by setting the “Term Baud” and “Emulation” parameters as desired. Then a terminal is connected to Connector J1 on the Back Panel.

A “break” signal on the communications line, pressing “ESC” on the terminal or Power On of the modem will initiate full screen terminal mode printing and redraw the full screen. The terminal mode displays the present status of all user parameters controlled and read by the processor, and offers a menu allowing change to any controlled parameter.

Representations of the terminal screens are shown in Figures 4-5 through 4-12. These screens may differ from the exact screens displayed due to changes in software and the presence (or absence) of options in the modem hardware. For instance, the presence of RF Switch control hardware will result in added options available on the screens, or additional screens to be available.

### 4.8.1 Connecting the Terminal

1. Connect the Terminal to the Terminal Connector (J1) on the rear of the unit using the RS-232 null modem Cable.

2. Verify that your emulation software is set to the following:

   - 8 data bits
   - no parity
   - 1 stop bit
   - No Flow Control

   Modify the selection, if necessary, to match the settings (the Front Panel 'SYSTEM' Sub-Menu contains all the Terminal Emulation Controls).

### 4.8.2 Terminal Screens

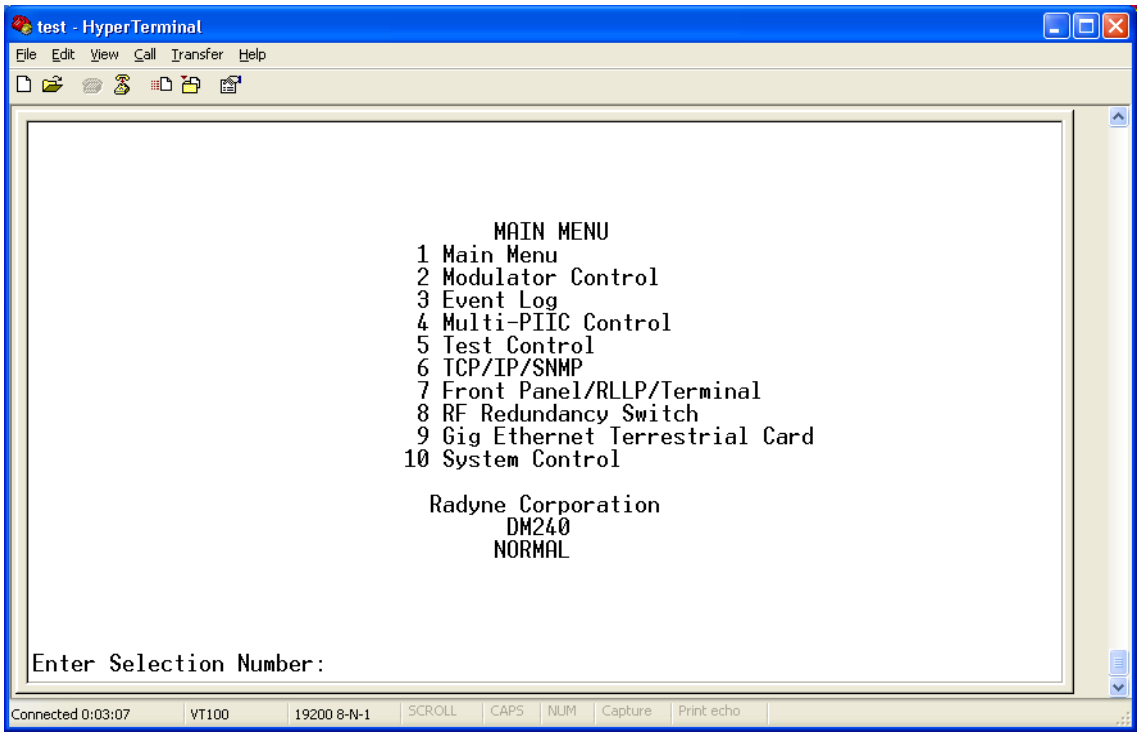



**Figure 4-5. Main Menu**

**Note:** The GIG Ethernet Terrestrial Card is only displayed when the Ethernet Data Interface is installed.

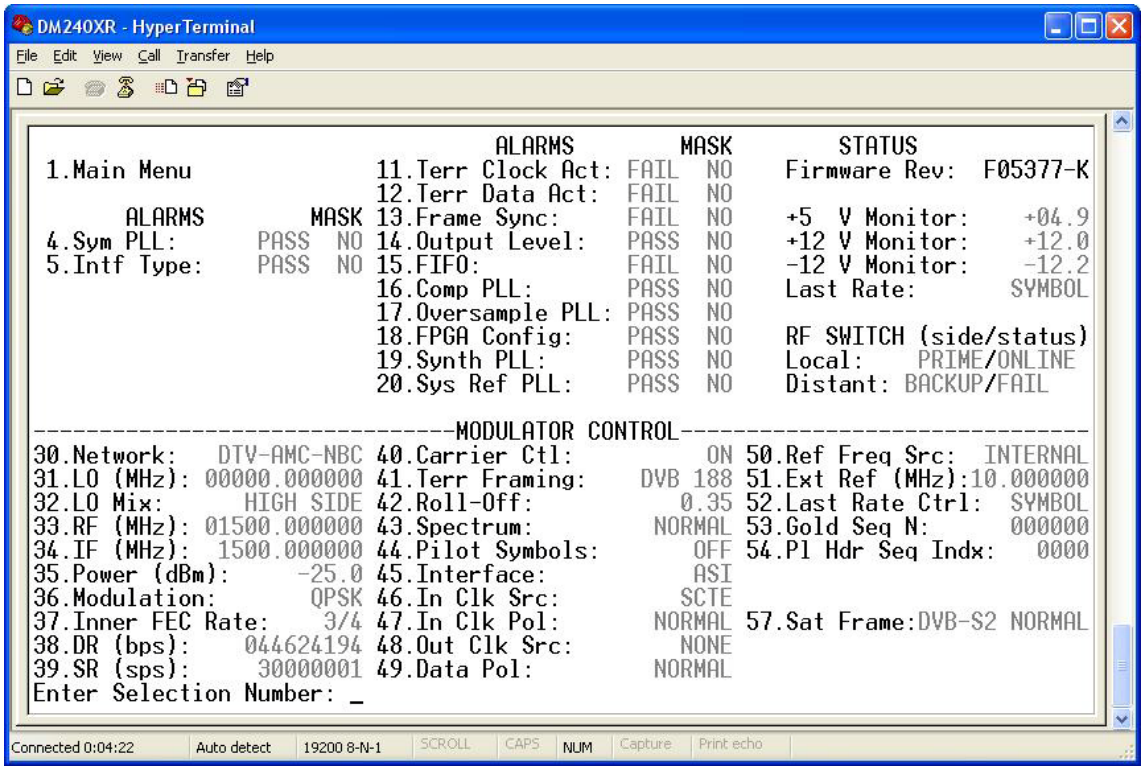

DM240XR - HyperTerminal
File Edit View Call Transfer Help
ALARMS MASK STATUS
1.Main Menu 11.Terr Clock Act: FAIL NO Firmware Rev: F05377-K
12.Terr Data Act: FAIL NO
ALARMS MASK 13.Frame Sync: FAIL NO +5 V Monitor: +04.9
4.Sym PLL: PASS NO 14.Output Level: PASS NO +12 V Monitor: +12.0
5.Intf Type: PASS NO 15.FIFO: FAIL NO -12 V Monitor: -12.2
16.Comp PLL: PASS NO Last Rate: SYMBOL
17.Oversample PLL: PASS NO
18.FPGA Config: PASS NO RF SWITCH (side/status)
19.Synth PLL: PASS NO Local: PRIME/ONLINE
20.Sys Ref PLL: PASS NO Distant: BACKUP/FAIL
MODULATOR CONTROL
30.Network: DTV-AMC-NBC 40.Carrier Ctl: ON 50.Ref Freq Src: INTERNAL
31.LO (MHz): 00000.000000 41.Terr Framing: DVB 188 51.Ext Ref (MHz):10.000000
32.LO Mix: HIGH SIDE 42.Roll-Off: 0.35 52.Last Rate Ctrl: SYMBOL
33.RF (MHz): 01500.000000 43.Spectrum: NORMAL 53.Gold Seq N: 000000
34.IF (MHz): 1500.000000 44.Pilot Symbols: OFF 54.Pl Hdr Seq Indx: 0000
35.Power (dBm): -25.0 45.Interface: ASI
36.Modulation: QPSK 46.In Clk Src: SCTE
37.Inner FEC Rate: 3/4 47.In Clk Pol: NORMAL 57.Sat Frame:DVB-S2 NORMAL
38.DR (bps): 044624194 48.Out Clk Src: NONE
39.SR (sps): 30000001 49.Data Pol: NORMAL
Enter Selection Number: _
Connected 0:04:22 Auto detect 19200 8-N-1 SCROLL CAPS NUM Capture Print echo

**Figure 4-6. Modulator Menu**

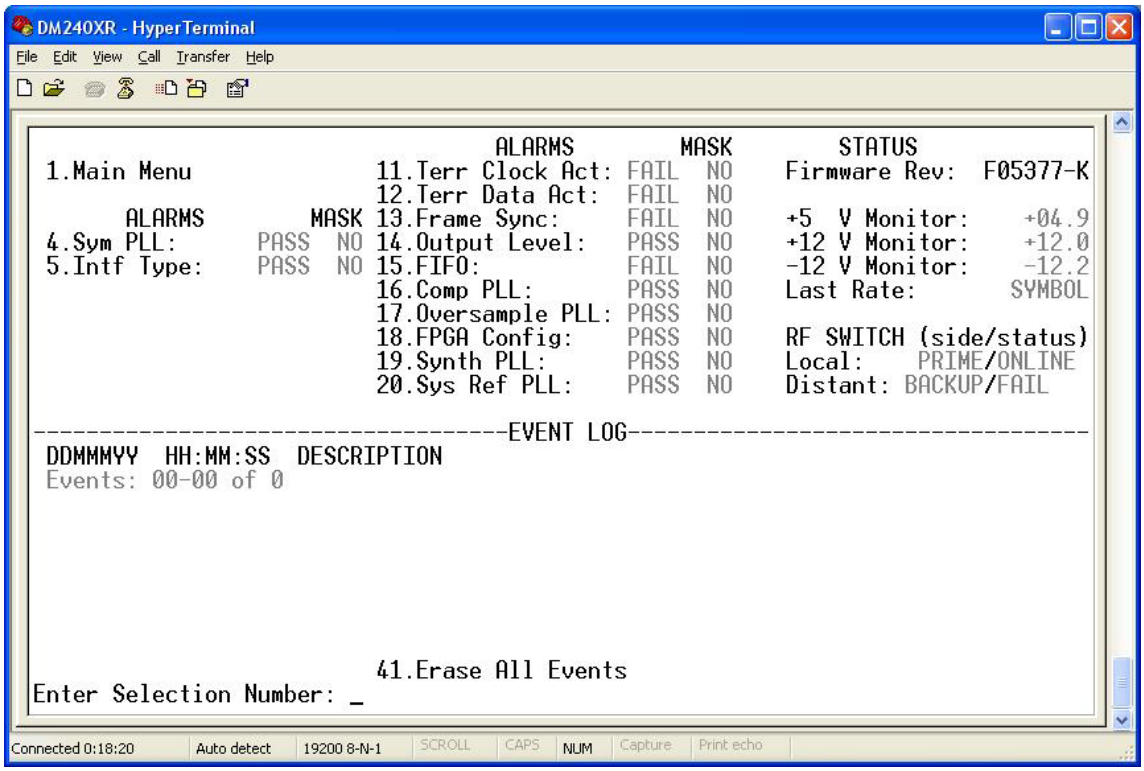

DM240XR - HyperTerminal
File Edit View Call Transfer Help
ALARMS MASK STATUS
1.Main Menu 11.Terr Clock Act: FAIL NO Firmware Rev: F05377-K
12.Terr Data Act: FAIL NO
ALARMS MASK 13.Frame Sync: FAIL NO +5 V Monitor: +04.9
4.Sym PLL: PASS NO 14.Output Level: PASS NO +12 V Monitor: +12.0
5.Intf Type: PASS NO 15.FIFO: FAIL NO -12 V Monitor: -12.2
16.Comp PLL: PASS NO Last Rate: SYMBOL
17.Oversample PLL: PASS NO
18.FPGA Config: PASS NO RF SWITCH (side/status)
19.Synth PLL: PASS NO Local: PRIME/ONLINE
20.Sys Ref PLL: PASS NO Distant: BACKUP/FAIL
EVENT LOG
DDMMMYY HH:MM:SS DESCRIPTION
Events: 00-00 of 0
41.Erase All Events
Enter Selection Number: _
Connected 0:18:20 Auto detect 19200 8-N-1 SCROLL CAPS NUM Capture Print echo

**Figure 4-7. Event Log Menu**

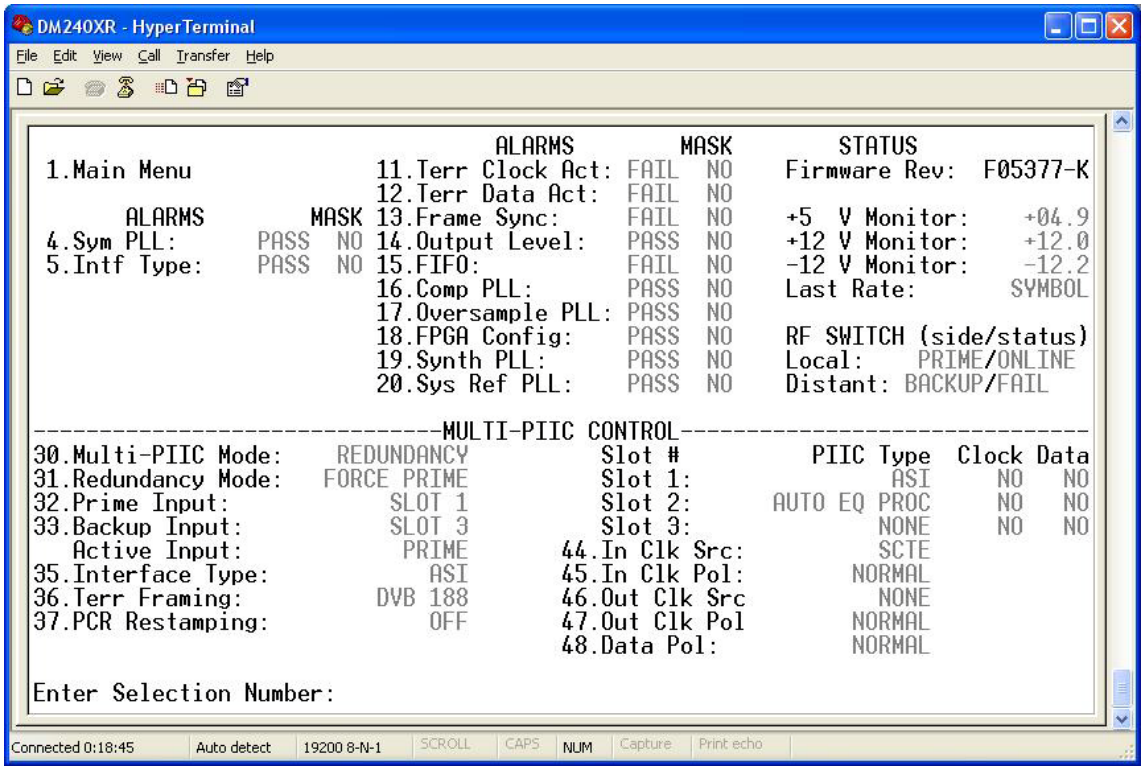

DM240XR - HyperTerminal
File Edit View Call Transfer Help
ALARMS MASK STATUS
1.Main Menu 11.Terr Clock Act: FAIL NO Firmware Rev: F05377-K
12.Terr Data Act: FAIL NO
ALARMS MASK 13.Frame Sync: FAIL NO +5 V Monitor: +04.9
4.Sym PLL: PASS NO 14.Output Level: PASS NO +12 V Monitor: +12.0
5.Intf Type: PASS NO 15.FIFO: FAIL NO -12 V Monitor: -12.2
16.Comp PLL: PASS NO Last Rate: SYMBOL
17.Oversample PLL: PASS NO
18.FPGA Config: PASS NO RF SWITCH (side/status)
19.Synth PLL: PASS NO Local: PRIME/ONLINE
20.Sys Ref PLL: PASS NO Distant: BACKUP/FAIL
MULTI-PIIC CONTROL
30.Multi-PIIC Mode: REDUNDANCY Slot # PIIC Type Clock Data
31.Redundancy Mode: FORCE PRIME Slot 1: ASI NO NO
32.Prime Input: SLOT 1 Slot 2: AUTO EQ PROC NO NO
33.Backup Input: SLOT 3 Slot 3: NONE NO NO
Active Input: PRIME 44.In Clk Src: SCTE
35.Interface Type: ASI 45.In Clk Pol: NORMAL
36.Terr Framing: DVB 188 46.Out Clk Src NONE
37.PCR Restamping: OFF 47.Out Clk Pol NORMAL
48.Data Pol: NORMAL
Enter Selection Number:
Connected 0:18:45 Auto detect 19200 8-N-1 SCROLL CAPS NUM Capture Print echo

**Figure 4-8. Multi-PIIC Control Menu**

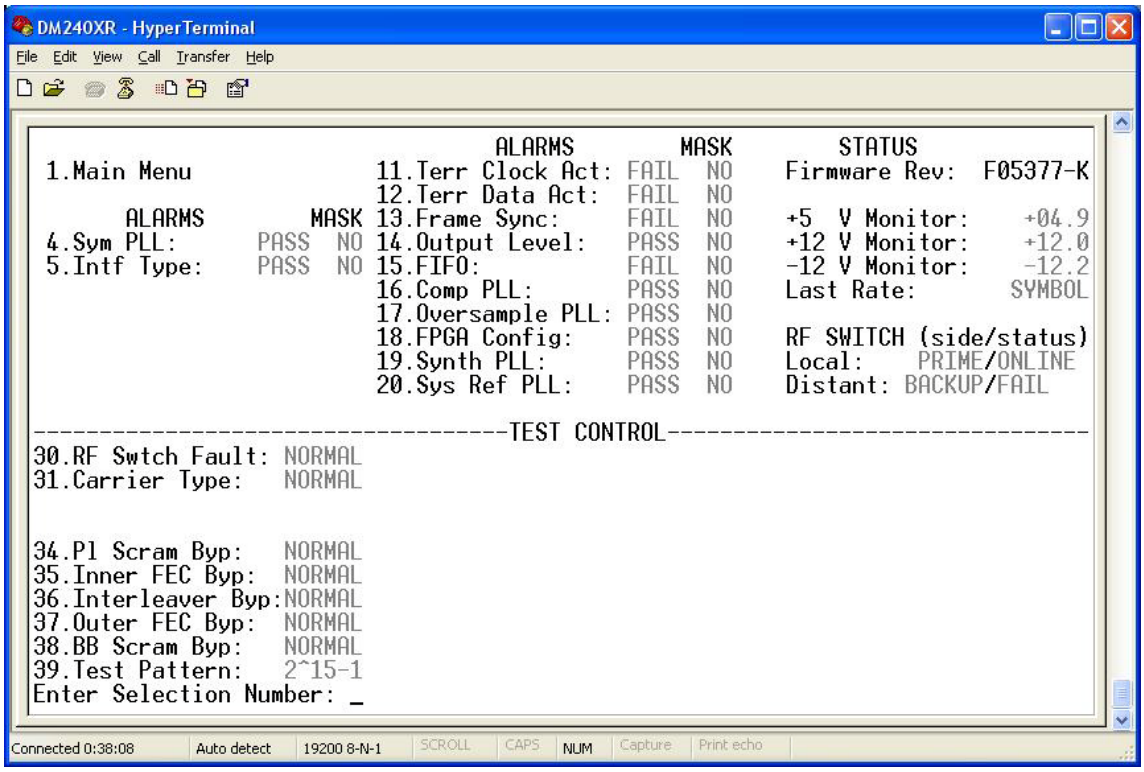

DM240XR - HyperTerminal
File Edit View Call Transfer Help
ALARMS MASK STATUS
1.Main Menu 11.Terr Clock Act: FAIL NO Firmware Rev: F05377-K
12.Terr Data Act: FAIL NO
ALARMS MASK 13.Frame Sync: FAIL NO +5 V Monitor: +04.9
4.Sym PLL: PASS NO 14.Output Level: PASS NO +12 V Monitor: +12.0
5.Intf Type: PASS NO 15.FIFO: FAIL NO -12 V Monitor: -12.2
16.Comp PLL: PASS NO Last Rate: SYMBOL
17.Oversample PLL: PASS NO
18.FPGA Config: PASS NO RF SWITCH (side/status)
19.Synth PLL: PASS NO Local: PRIME/ONLINE
20.Sys Ref PLL: PASS NO Distant: BACKUP/FAIL
TEST CONTROL
30.RF Swtch Fault: NORMAL
31.Carrier Type: NORMAL
34.Pl Scram Byp: NORMAL
35.Inner FEC Byp: NORMAL
36.Interleaver Byp: NORMAL
37.Outer FEC Byp: NORMAL
38.BB Scram Byp: NORMAL
39.Test Pattern: 2^15-1
Enter Selection Number: _
Connected 0:38:08 Auto detect 19200 8-N-1 SCROLL CAPS NUM Capture Print echo

**Figure 4-9. Test Control Menu**

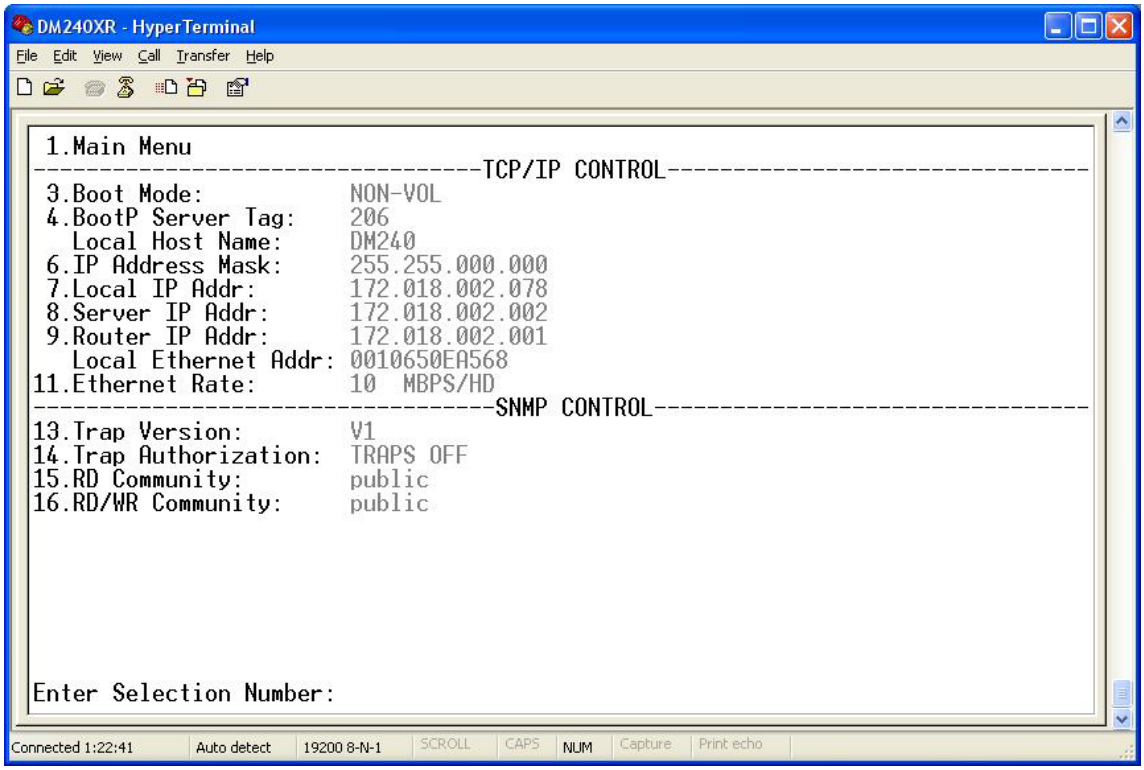



**Figure 4-10. TCP/IP/SNMP Control Menu**

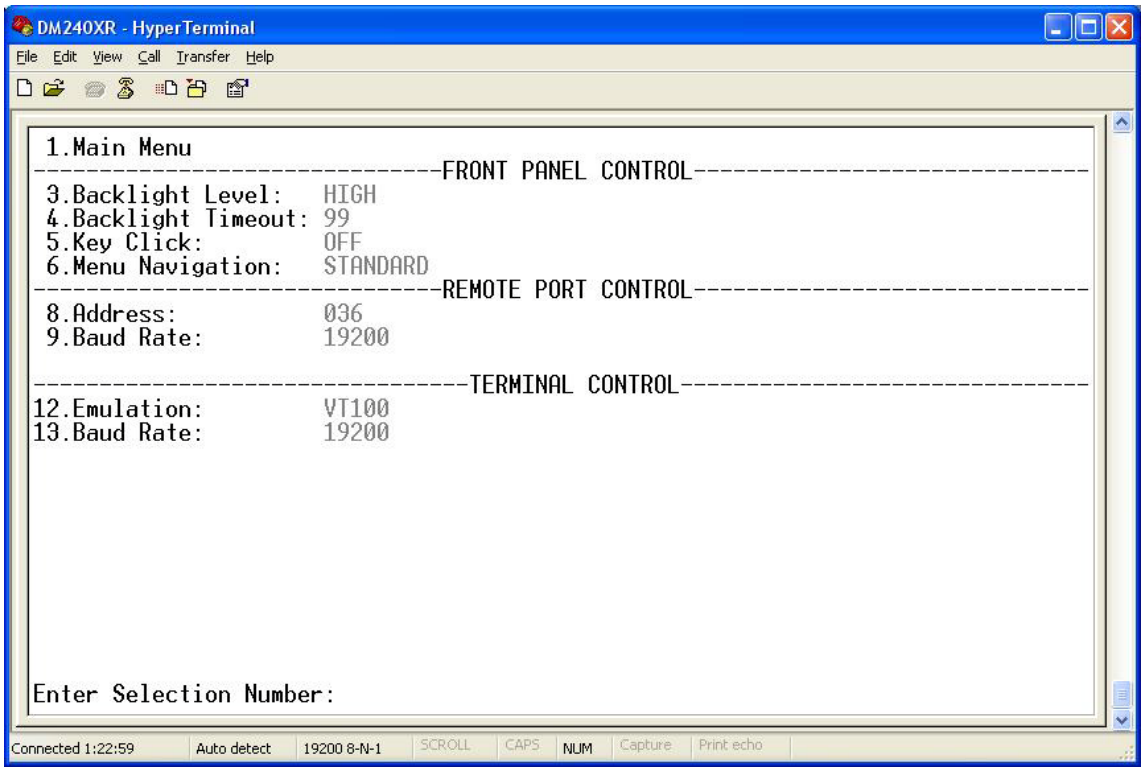



**Figure 4-11. Front Panel/RLLP/Terminal Control Menu**

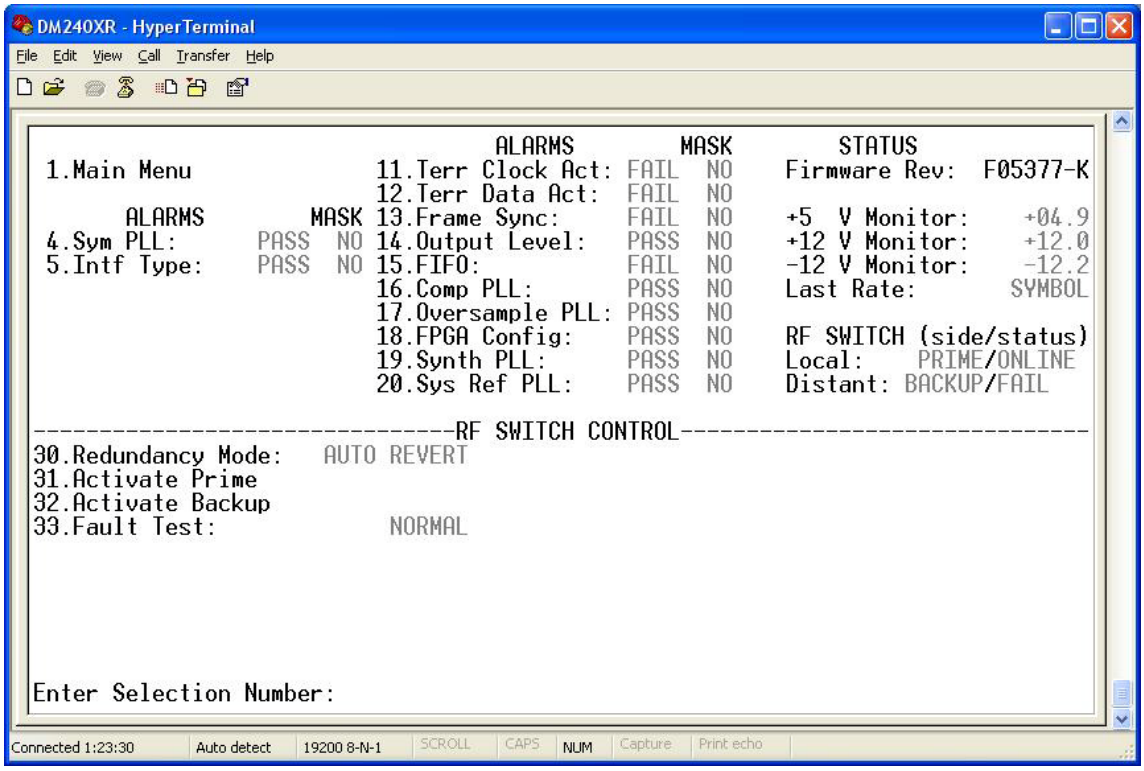

DM240XR - HyperTerminal
File Edit View Call Transfer Help
ALARMS MASK STATUS
1.Main Menu 11.Terr Clock Act: FAIL NO Firmware Rev: F05377-K
12.Terr Data Act: FAIL NO
ALARMS MASK 13.Frame Sync: FAIL NO +5 V Monitor: +04.9
4.Sym PLL: PASS NO 14.Output Level: PASS NO +12 V Monitor: +12.0
5.Intf Type: PASS NO 15.FIFO: FAIL NO -12 V Monitor: -12.2
16.Comp PLL: PASS NO Last Rate: SYMBOL
17.Oversample PLL: PASS NO
18.FPGA Config: PASS NO RF SWITCH (side/status)
19.Synth PLL: PASS NO Local: PRIME/ONLINE
20.Sys Ref PLL: PASS NO Distant: BACKUP/FAIL
----------RF SWITCH CONTROL----------
30.Redundancy Mode: AUTO REVERT
31.Activate Prime
32.Activate Backup
33.Fault Test: NORMAL
Enter Selection Number:
Connected 1:23:30 Auto detect 19200 8-N-1 SCROLL CAPS NUM Capture Print echo

**Figure 4-12. RF Redundancy Switch Menu**

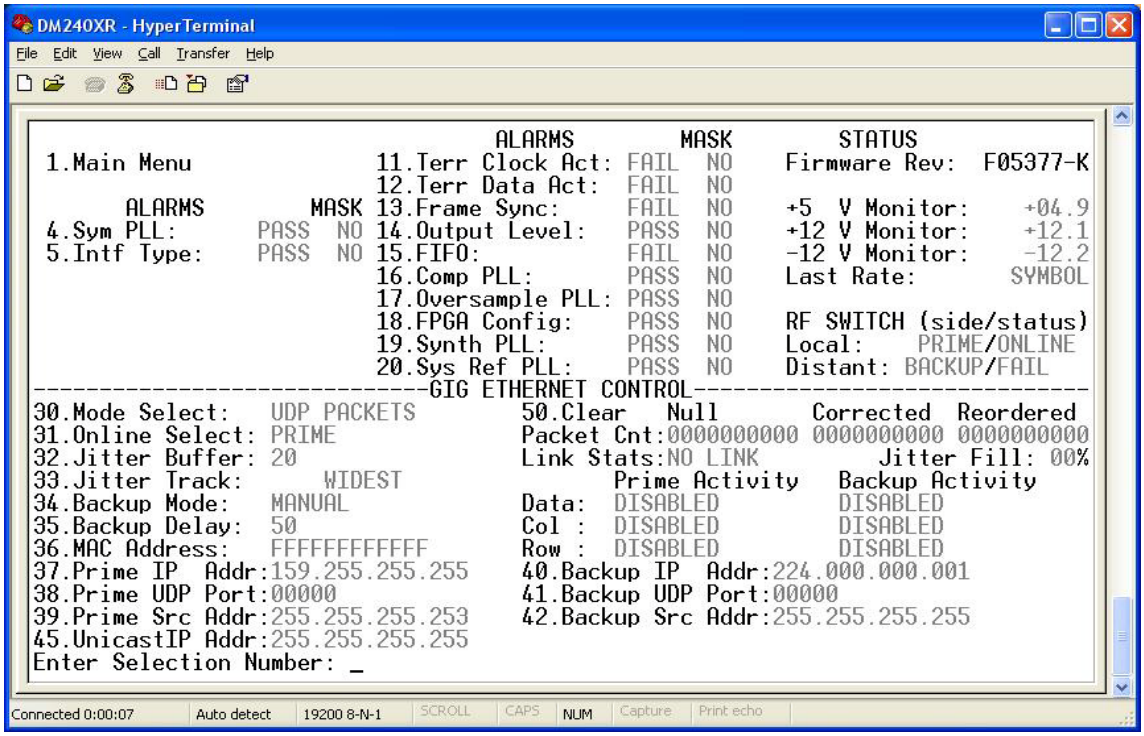

DM240XR - HyperTerminal
File Edit View Call Transfer Help
ALARMS MASK STATUS
1.Main Menu 11.Terr Clock Act: FAIL NO Firmware Rev: F05377-K
12.Terr Data Act: FAIL NO
ALARMS MASK 13.Frame Sync: FAIL NO +5 V Monitor: +04.9
4.Sym PLL: PASS NO 14.Output Level: PASS NO +12 V Monitor: +12.1
5.Intf Type: PASS NO 15.FIFO: FAIL NO -12 V Monitor: -12.2
16.Comp PLL: PASS NO Last Rate: SYMBOL
17.Oversample PLL: PASS NO
18.FPGA Config: PASS NO RF SWITCH (side/status)
19.Synth PLL: PASS NO Local: PRIME/ONLINE
20.Sys Ref PLL: PASS NO Distant: BACKUP/FAIL
----------GIG ETHERNET CONTROL----------
30.Mode Select: UDP PACKETS 50.Clear Null Corrected Reordered
31.Online Select: PRIME Packet Cnt:0000000000 0000000000 0000000000
32.Jitter Buffer: 20 Link Stats:NO LINK Jitter Fill: 00%
33.Jitter Track: WIDEST Prime Activity Backup Activity
34.Backup Mode: MANUAL Data: DISABLED DISABLED
35.Backup Delay: 50 Col : DISABLED DISABLED
36.MAC Address: FFFFFFFFFFFF Row : DISABLED DISABLED
37.Prime IP Addr:159.255.255.255 40.Backup IP Addr:224.000.000.001
38.Prime UDP Port:00000 41.Backup UDP Port:00000
39.Prime Src Addr:255.255.255.253 42.Backup Src Addr:255.255.255.255
45.UnicastIP Addr:255.255.255.255
Enter Selection Number: _
Connected 0:00:07 Auto detect 19200 8-N-1 SCROLL CAPS NUM Capture Print echo

**Figure 4-13. Gig Ethernet Terrestrial Menu**

**Note:** Only displayed when the Ethernet Data Interface is installed.

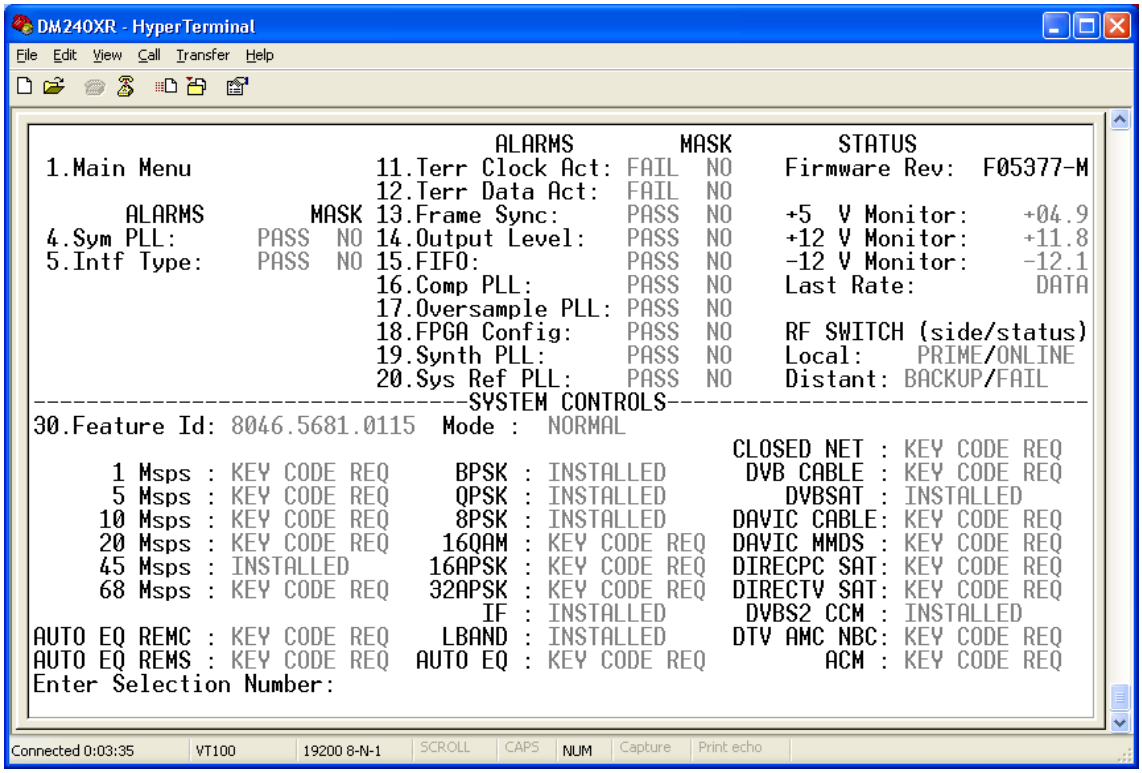

DM240XR - HyperTerminal
File Edit View Call Transfer Help
ALARMS MASK STATUS
1.Main Menu 11.Terr Clock Act: FAIL NO Firmware Rev: F05377-M
12.Terr Data Act: FAIL NO
ALARMS MASK 13.Frame Sync: PASS NO +5 V Monitor: +04.9
4.Sym PLL: PASS NO 14.Output Level: PASS NO +12 V Monitor: +11.8
5.Intf Type: PASS NO 15.FIFO: PASS NO -12 V Monitor: -12.1
16.Comp PLL: PASS NO Last Rate: DATA
17.Oversample PLL: PASS NO
18.FPGA Config: PASS NO RF SWITCH (side/status)
19.Synth PLL: PASS NO Local: PRIME/ONLINE
20.Sys Ref PLL: PASS NO Distant: BACKUP/FAIL
SYSTEM CONTROLS
30.Feature Id: 8046.5681.0115 Mode : NORMAL
CLOSED NET : KEY CODE REQ
1 Msps : KEY CODE REQ BPSK : INSTALLED DVB CABLE : KEY CODE REQ
5 Msps : KEY CODE REQ QPSK : INSTALLED DVBSAT : INSTALLED
10 Msps : KEY CODE REQ 8PSK : INSTALLED DAVIC CABLE: KEY CODE REQ
20 Msps : KEY CODE REQ 16QAM : KEY CODE REQ DAVIC MMDS : KEY CODE REQ
45 Msps : INSTALLED 16APSK : KEY CODE REQ DIRECPC SAT: KEY CODE REQ
68 Msps : KEY CODE REQ 32APSK : KEY CODE REQ DIRECTV SAT: KEY CODE REQ
IF : INSTALLED DVBS2 CCM : INSTALLED
AUTO EQ REMC : KEY CODE REQ LBAND : INSTALLED DTV AMC NBC: KEY CODE REQ
AUTO EQ REMS : KEY CODE REQ AUTO EQ : KEY CODE REQ ACM : KEY CODE REQ
Enter Selection Number:
Connected 0:03:35 VT100 19200 8-N-1 SCROLL CAPS NUM Capture Print echo

**Figure 4-14. SYSTEMS CONTROL Menu**

**Notes:**

# Chapter 5. Rear Panel Interfaces

This section discusses the electrical interfaces available from the rear panel. All locations are as viewed from the rear of the unit unless otherwise specified.

## 5.1 DM240XR Connections

All DM240XR connections are made to labeled connectors located on the rear of the unit. Any connection interfacing to the DM240XR must be the appropriate mating connector. DM240XR Optional Data Interfaces are shown in Figures 5-1b – 5-1i.

**Figure 5-1a. DM240XR Rear Panel Connectors**

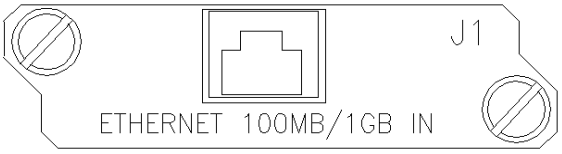



**Figure 5-1b. DM240XR Rear Panel Connectors (Ethernet)**

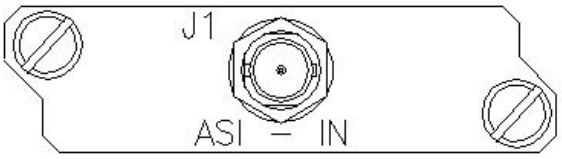



**Figure 5-1c. DM240XR Rear Panel Connectors (ASI IN)**

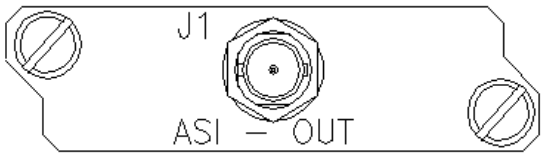



**Figure 5-1d. DM240XR Rear Panel Connectors (ASI OUT)**

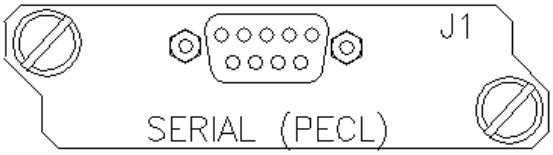



**Figure 5-1e. DM240XR Rear Panel Connectors (Serial PECL)**

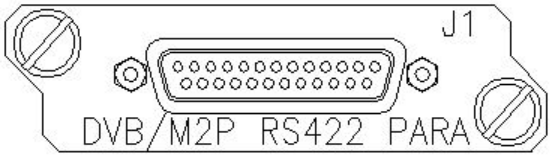



**Figure 5-1f. DM240XR Rear Panel Connectors (DVB/M2P RS422 PARA)**

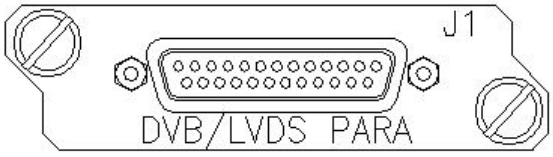



**Figure 5-1g. DM240XR Rear Panel Connectors (DVB/LVDS PARA)**

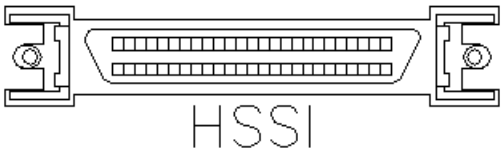



**Figure 5-1h. DM240XR Rear Panel Connectors (HSSI)**

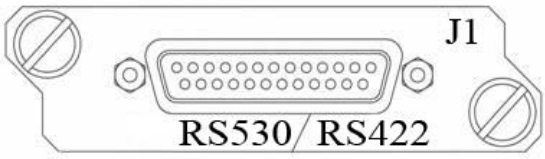



**Figure 5-1i. DM240XR Rear Panel Connectors (RS530/RS422)**

## 5.2 AC Power

The unit is powered from a 100 – 240 VAC, 50 – 60 Hz source. Maximum unit power consumption is 25 W. The switch turns power on and off to the unit. A chassis ground connection can be made at the stud located to the lower right of the AC Power Connector.

## 5.3 Compact Flash Interface (J5)

The Compact Flash Interface allows a Compact Flash Card to be inserted for three main functions:

- Normal Operation
- Firmware Update
- Custom Configuration

### 5.3.1 Feature Upgrade

Refer to section A.

### 5.3.2 Firmware Update

A new Compact Flash Card with the upgraded firmware is required for each unit.

1. Power off the unit.
2. Remove Compact Flash.
3. Install new Compact Flash.
4. Power on unit.
5. Verify the firmware under the “SYSTEM MENU”.

### 5.3.3 Custom Configuration

For a custom configuration, the customer orders a Custom Configuration Compact Flash Card.

Perform the following steps:

1. Power off the unit.
2. Install the Custom Configuration Compact Flash Card.
3. Power the unit on.

The unit will operate in the custom configuration as long as the Compact Flash Card is installed. If the card is removed and power is cycled, the original operation is restored.

## 5.4 Ethernet Interface (J6)

The Ethernet Interface (J6) can be used for the monitor & control functions of the unit. The physical interface is a standard female RJ-45 Connector. Refer to Section 4.5 for programming details.

## 5.5 External Reference (Input)

The External Reference Input (J8) is supplied to allow the customer to phase-lock the modulator's internal oscillator to an external reference.

This female BNC Connector accepts a 1.5 – 5 Vp-p @ 50 Ohms. The frequency range of the external reference is 1 – 10 MHz in 8 kHz steps.

## 5.6 Remote Port (I/O)

The Remote Port Interface (J4) can be used for the monitor & control functions of the unit. The physical interface is a female 9-Pin D-Sub Connector. This bi-directional port complies with RS-485 Electrical Specifications. Refer to Section 7.6 for protocol and programming details. Pinouts are listed in Table 5-1.

**Table 5-1. J4 - RS-485 Remote Control- 9-Pin 'D' Female**

| Pin No. | Signal | Description | Direction |
|---|---|---|---|
| 1 | Tx (B) | Transmit Data (+) | Output |
| 5 | GND | Ground | --- |
| 6 | Tx (A) | Transmit Data (-) | Output |
| 8 | Rx (B) | Receive Data (+) | Input |
| 9 | Rx (A) | Receive Data (-) | Input |

## 5.7 Terminal Port (I/O)

The Terminal Port Interface (J1) can be used for the monitor & control functions of the unit. The physical interface is a female 9-Pin D-Sub Connector. This bi-directional port complies with RS-232 Electrical Specifications. Refer to Section 4.8 for terminal interface details. The pinouts are listed in Table 5-2.

**Table 5-2. J1 - RS-232 Terminal Port - 9-Pin 'D' Female**

| Pin No. | Signal Name | Description | Direction |
|---|---|---|---|
| 3 | TxD | Transmit Data | Output |
| 2 | RxD | Receive Data | Input |
| 5 | GND | Ground | --- |
| 7 | RTS | Request to Send | Output |
| 8 | CTS | Clear to Send | Input |

## 5.8 Alarm Port

The Alarm Connector (J3) is used to indicate the fault condition of the modulator to external equipment. This male 9-Pin D-Sub Connector provides connection to two Form-C relays and an open collector output. The user can distinguish between major and minor alarms with the relays. Refer to Table 5-3 for connector pinouts. Table 5-4 below describes the alarm indications.

**Table 5-3. Alarm Connector J3 Pin Assignment**

| Pin No. | Connection |
|---|---|
| 1 | Relay 1 NO |
| 2 | Relay 1 C |
| 3 | Relay 1 NC (Major Alarm) |
| 4 | Ground |
| 5 | No Connect |
| 6 | Mod Fault (Open Collector) |
| 7 | Relay 2 NO |
| 8 | Relay 2 C |
| 9 | Relay 2 NC (Minor Alarm) |

**Table 5-4. Alarm Indications**

| Alarm | Pin Description |
|---|---|
| None | 1 – 2 shorted, 7 – 8 shorted, open collector output driven low |
| Minor | 1 – 2 shorted, 8 – 9 shorted, open collector output driven low |
| Major | 2 – 3 shorted, 7 – 8 shorted, open collector output open |

## 5.9 IF Output Port (J10 & J11)

The DM240XR is designed to support IF and L-band frequencies. The rear panel of the DM240XR has separate IF and L-Band connectors. Refer to figure 5.1a. The IF frequency is programmable from 50-90Mhz to 100-180Mhz. The IF port is a 75 ohm BNC connector (J10). The output power level is programmable from –25 to 0dBm in 0.1 dBm steps. The L-Band frequency is programmable from 950 to 2050Mhz. The L-band port is a 50 Ohm SMA female connector (J11). The output power level is programmable from -25 to 0 dBm in 0.1 dBm steps.

### 5.9.1 Output Monitor Port (J9)

The output monitor port on the DM240XR is an 50 Ohm SMA female connector. The monitor is a sample of the output frequency that is –20dBc +/-5dB from the output frequency power level.

## 5.10 RF Redundancy Switch Control (J2)

The Each modulator has a 9-pin D-sub connector for the switch. A 1:1 cable is connected from each modulator to the switch. The pinout for the control connector is listed in Table 5-5.

**Table 5-5. RF Switch Control 9-pin 'D' Female (J2)**

| Pin No. | Signal | Description | Direction |
|---|---|---|---|
| 5 | Signal Ground | Modulator GND | Output |
| 9 | Backup Select | One modulator is designated as Backup. This line is tied low on the Backup Mod Control connector. | Input |
| 1 | +DC | +12V DC power | Output |
| 2 | nPrime_Sel | Forces On-Line output to Prime | Output |
| 7 | nBackup_Sel | Forces On-Line output to Backup | Output |
| 8 | Local Fault | Fault output of modulator | Output |
| 4 | Distant Fault | State of distant modulator | Input |
| 3 | Switch-State | Switch state monitor.<br>Logic '1' = Prime Online | Input |
| 6 | NC | --- | --- |

## 5.11 Built in ASI/Advanced ASI Interface (J7)

The "Built In" ASI/AASI comes standard on every DM-240XR unit. This ASI interface is supported on the BNC Connector. The interface complies with DVB ASI Electrical Specifications. The maximum data rate is 216 Mbps.

The AASI Interface is a specialized mode of the normal ASI Interface. The interface allows the user to input a variable rate data stream into the modulator (as long as the input data rate does not exceed the programmed data rate). The AASI Interface inserts MPEG-2 Null Packets to provide a constant data rate to the modulator.

## 5.12 Plug-In Interface Cards (PIICs)

The DM-240XR provides the customer with 2 standard PIIC slots. With PIIC interfaces there is greater flexibility for changing and upgrading the terrestrial interface. Each of the interfaces described below consists of a single card with a metal back plate. Each interface can be plugged into one of two slots on the rear of the unit (Figure 5-4).

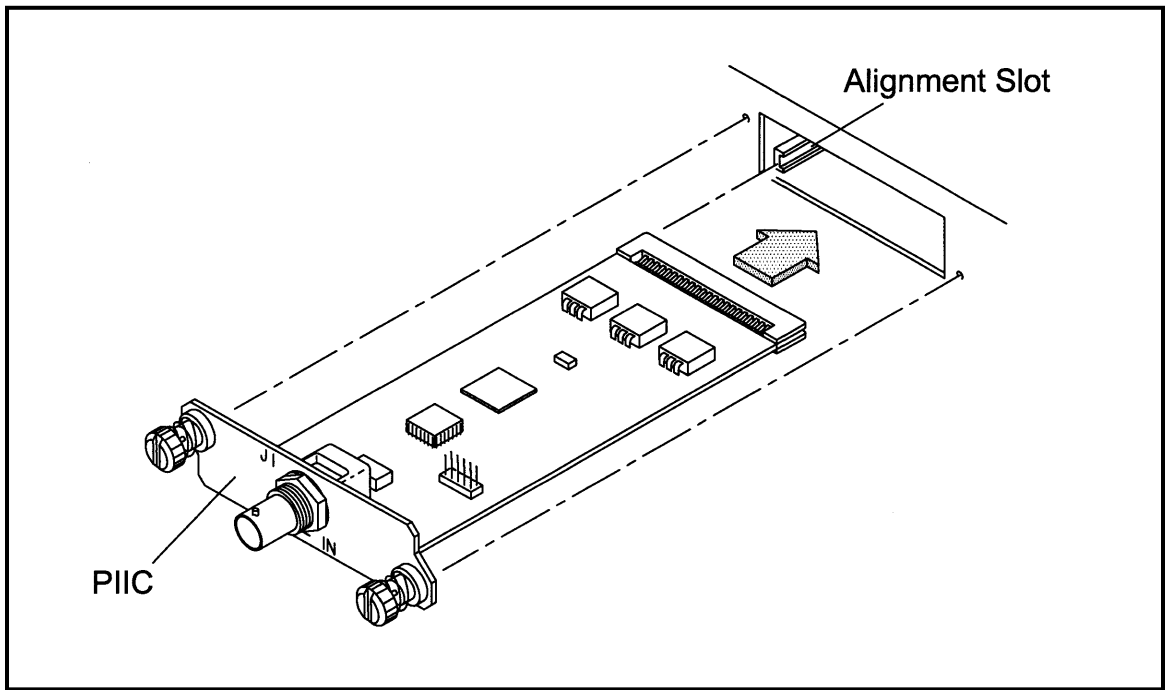



**Figure 5-4, Typical PIIC**

To insert the PIIC, slide the card completely into the appropriate slot (1 or 2) ensuring that it lines up with the alignment slots. When the PIIC is fully seated, tighten the two screws hand tight

### 5.12.1 ASI PIIC

This interface supports two terrestrial interface types.

#### 5.12.1.1 ASI (Asynchronous Serial Interface)

The ASI interface is supported on the BNC Connector (Figure 5-1c). The interface complies with DVB ASI Electrical Specifications. The maximum data rate is 216 Mbps.

#### 5.12.1.2 AASI (Advanced Asynchronous Serial Interface)

The AASI Interface is a specialized mode of the normal ASI Interface (Figure 5.1b). The interface allows the user to input a variable rate data stream into the modulator (as long as the input data rate does not exceed the programmed data rate). The AASI Interface inserts MPEG-2 Null Packets to provide a constant data rate to the modulator.

### 5.12.2 ASI Monitor

Incoming data from the active PIIC slot is output on this interface (Figure 5-1d), allowing the customer to monitor the incoming data stream. The interface complies with DVB ASI Electrical Specifications.

### 5.12.3 Parallel RS-422 Interface

This interface supports two terrestrial interface types and complies with RS-422 Electrical Specifications (Figure 5.1f).

#### 5.12.3.1 M2P (Parallel, RS-422)

M2P is supported on the DB-25 female connector. It complies with RS-422 Electrical Specifications. Refer to Table 5-5 for pinouts for this connector. The maximum data rate is 238 Mbps.

**Table 5-5. M2P RS-422 Parallel - 25-Pin Female**

| Pin No. | Signal Name | Direction |
|---|---|---|
| 1 | OUTCLK+ | Output |
| 14 | OUTCLK- | Output |
| 2 | CLK+ | Input |
| 15 | CLK- | Input |
| 3 | SYNC+ | Input |
| 16 | SYNC- | Input |
| 4 | VALID+ | Input |
| 17 | VALID- | Input |
| 5 | D0+ | Input |
| 18 | D0- | Input |
| 6 | D1+ | Input |
| 19 | D1- | Input |
| 7 | D2+ | Input |
| 20 | D2- | Input |
| 8 | D3+ | Input |
| 21 | D3- | Input |
| 9 | D4+ | Input |
| 22 | D4- | Input |
| 10 | D5+ | Input |
| 23 | D5- | Input |

| Table 5-5. M2P RS-422 Parallel - 25-Pin Female | | |
|---|---|---|
| **Pin No.** | **Signal Name** | **Direction** |
| 11 | D6+ | Input |
| 24 | D6- | Input |
| 12 | D7+ | Input |
| 25 | D7- | Input |
| 13 | Not Connected | - |

### 5.12.3.2 DVB (Parallel, RS-422)

The DVB Interface is also supported on the DB-25 Female Connector. It complies with RS-422 Electrical Specifications. The pinouts for this connector are given in Table 5-6.

| Table 5-6. DVB RS-422 Parallel, 25-Pin Female | | |
|---|---|---|
| **Pin No.** | **Signal Name** | **Direction** |
| 1 | Clock + | Input |
| 2 | System GND | Ground |
| 3 | D7 + | Input |
| 4 | D6 + | Input |
| 5 | D5 + | Input |
| 6 | D4 + | Input |
| 7 | D3 + | Input |
| 8 | D2 + | Input |
| 9 | D1 + | Input |
| 10 | D0 + | Input |
| 11 | DVALID + | Input |
| 12 | PSYNC + | Input |
| 13 | Cable Shield | Input |
| 14 | Clock - | Input |
| 15 | System GND | Ground |
| 16 | D7 - | Input |
| 17 | D6 - | Input |
| 18 | D5 - | Input |
| 19 | D4 - | Input |
| 20 | D3 - | Input |

| Table 5-6. DVB RS-422 Parallel, 25-Pin Female | | |
|---|---|---|
| **Pin No.** | **Signal Name** | **Direction** |
| 21 | D2 - | Input |
| 22 | D1 - | Input |
| 23 | D0 - | Input |
| 24 | DVALID - | Input |
| 25 | SYNC - | Input |

## 5.12.4 Parallel LVDS Interface

This interface is identical to the Parallel RS-422 Interface except that it complies with the LVDS Electrical Specification.

## 5.12.5 HSSI Interface

The HSSI (High-Speed Serial Interface) complies with the HSSI Functional and Electrical Specifications. The physical interface is a 50 Pin SCSI-2 Type Connector. Electrical levels are ECL. The pin outs for this interface are listed in Table 5-9.

| Table 5-9. HSSI (High-Speed Serial Interface) 50-Pin Connector | | | | |
|---|---|---|---|---|
| **Pin No. (+)** | **Pin No. (–)** | **Signal Name** | **Description** | **Direction** |
| 1 | 26 | SG | Signal Ground | --- |
| 2 | 27 | RT | Receive Timing | Output |
| 3 | 28 | CA | DCE Available | Output |
| 4 | 29 | RD | Receive Data | Output |
| 5 | 30 | LC | Loopback Circuit C | Output |
| 6 | 31 | ST | Send Timing (SCT) | Output |
| 7 | 32 | SG | Signal Ground | --- |
| 8 | 33 | TA | DTE Available | Input |
| 9 | 34 | TT | Terminal Timing (SCTE) | Input |
| 10 | 35 | LA | Loopback Circuit A | Input |
| 11 | 36 | SD | Send Data | Input |
| 12 | 37 | LB | Loopback Circuit B | Input |
| 13 | 38 | SG | Signal Ground | --- |
| 14 - 18 | 39 – 43 | 5 Ancillary to DCE | Reserved | Input |
| 19 | 44 | SG | Signal Ground | --- |

| Table 5-9. HSSI (High-Speed Serial Interface) 50-Pin Connector | | | | |
|---|---|---|---|---|
| **Pin No. (+)** | **Pin No. (–)** | **Signal Name** | **Description** | **Direction** |
| 20 - 23 | 45 - 48 | 4 Ancillary from DCE | Reserved | Output |
| 24 | 49 | TM | Test Mode | Output- |

## 5.12.6 Ethernet 100/1000 Base-T Interface

The PIIC Ethernet Data Interface (Figure 5-1e) is a full duplex 100/1000 BaseT supported by an RJ45 connector . The EDI supports the input of generic UDP packets or Pro–MPEG COP3 formatted packets. With the Pro-MPEG input, a powerful video-specific packet-based forward error correction (FEC) algorithm is also available providing a cost-effective solution for error recovery in video streams transported over public or private IP networks.

## 5.12.7 EIA-530 /RS-422 Serial Interface

The EIA-530 Port is an RS-422 Connection. It is a 25-Pin Female “D” Connector. Refer to Figure 5-1i and Table 5-10 for pinouts.

| Table 5-10. RS530 (RS-422) Connector | | | |
|---|---|---|---|
| **Pin No.** | **Signal Name** | **Signal** | **Direction** |
| 1 | Shield | --- | --- |
| 2 | Send Data A (-) | SD-A | Input |
| 4 | Request To Send A (-) | RS-A | Input |
| 5 | Clear To Send A (-) | CS-A | Output |
| 6 | DCE Ready) | DM-A | Output |
| 7 | Signal Ground | SGND | --- |
| 11 | Terminal Timing B (+) | TT-B | Input |
| 12 | Send Timing B (+) | ST-B | Output |
| 13 | Clear T Send B (+) | CS-B | Output |
| 14 | Send Data B (+) | SD-B | Input |
| 15 | Send Timing A (-) | ST-A | Output |
| 18 | Local Loopback | LL | Input |
| 19 | Request To Send B (+) | RS-B | Input |
| 20 | Data Terminal Ready A (-) | TR-A | Input |
| 21 | Remote Loopback | RL | Input |
| 22 | Ring Indicator | IC | Output |
| 23 | Signal Common | RC | |

| Table 5-10. RS530 (RS-422) Connector | | | |
|---|---|---|---|
| **Pin No.** | **Signal Name** | **Signal** | **Direction** |
| 24 | Terminal Timing A (-) | TT-A | Input |
| 25 | Test Mode | TM | Output |

## 5.12.8 G.703 Interface (Contact factory for availability)

The G.703 Interface supports the following G.703 Rates: E1, T1, E2, T2, E3, T3, and STS-1. The interface complies with G.703 Electrical Specifications. Table 5-11 lists the data rate and physical interface for each rate.

IMPORTANT

***All balanced rates use Pins 1 (-) and 9 (+) of the DB-15 connector.***

| Table 5-11. Available G.703 Interfaces | | | | | |
|---|---|---|---|---|---|
| **G.703 Rate** | **Data Rate (Mbps)** | **Wire Type** | **Connector** | **Impedance (Ohms)** | **Coding** |
| E1 | 2.048 | Coax | Female BNC | 75 | HDB3 |
| E1 | 2.048 | Pair | DB-15 | 120 | HDB3 |
| T1 | 1.544 | Pair | DB-15 | 100 | AMI/B8ZS |
| E2 | 8.448 | Coax | Female BNC | 75 | HDB3 |
| T2 | 6.312 | Coax | Female BNC | 75 | B8ZS |
| T2 | 6.312 | Pair | DB-15 | 110 | B6ZS |
| E3 | 34.368 | Coax | Female BNC | 75 | HDB3 |
| T3 | 44.736 | Coax | Female BNC | 75 | B3ZS |
| STS-1 | 51.84 | Coax | Female BNC | 75 | B3ZS |

# Chapter 6. Maintenance and Troubleshooting

This section discusses unit maintenance and troubleshooting for the DM240XR High-Speed Digital Modulator.

## 6.1 Periodic Maintenance

The DM240XR modulator requires no periodic field maintenance procedures. Should a unit be suspected of a defect in field operations after all interface signals are verified, the correct procedure is to replace the unit with another known working DM240XR. If this does not cure the problem, wiring or power should be suspect.

There is no external fuse on the DM240XR. The fuse is located on the power supply assembly inside the case, and replacement is not intended in the field.

**Notes:**

# Chapter 7. Technical Specifications

## 7.1 Introduction

This section defines the technical performance parameters and specifications for the DM240XR Digital Modulator.

## 7.2 IF Specification

| | |
|---|---|
| Tx IF: | 50 to 90 MHz, 100 to 180 MHz (70/140 MHz), 950 to 2050 MHz (L-Band) |
| IF Step Size: | 1 Hz |
| Frequency Stability: | 1 ppm |
| Power Output: | 0 to -25 dBm |
| Power Output Accuracy: | ± 1.0 dB |
| Power Output Stability: | ± 0.5 dB |
| Carrier Mute: | -55 dB |
| Spurious Emissions: | -55 dBc, 50 to 90 and 100 to 180 MHz (70/140 MHz), 950 to 2050 MHz (L-Band)-45 dBc, all other frequencies |
| Output Impedance: | 50 Ohm (L-Band), 75 Ohm (70/140 MHz) |
| Return Loss: | 20 dB (70/140 MHz), 14 dB (L-Band) |
| Phase Noise: | 1 kHz -73 dBc10 kHz -86 dBc100 kHz -100 dBc1 MHz -120 dBc |
| Output Connector: | BNC Female (70/140 MHz), SMA Female (L-Band) |
| Monitor Port Output Connector: | SMA Female (Based on output frequency) |
| External Reference: | 1 to 10 MHz in 8 kHz steps, better than 10 ppm<br>1.5 to 5 Vp-p, 50 Ohms |

## 7.3 Baseband Specification

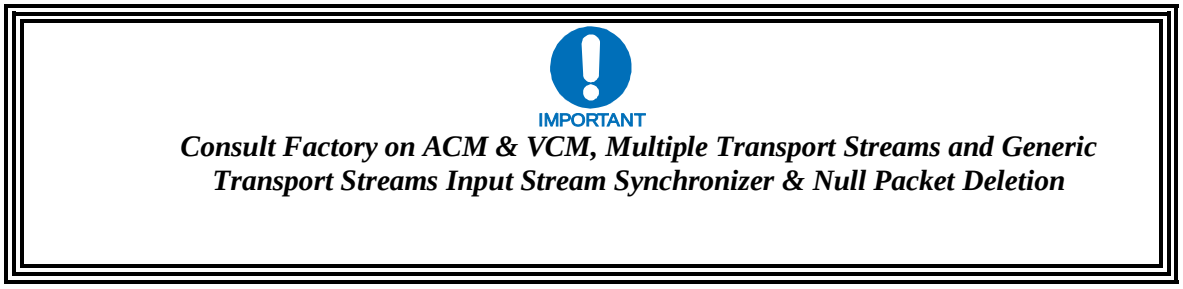
### 7.3.1 DVB-S

| | |
|---|---|
| Compliance | EN 300-421 and EN 301-210 |
| Modulation Types: | BPSK, QPSK, 8PSK, 16QAM |
| Data Rate: | 1 to 59.5 Mbps in 1 bps steps (BPSK)<br>1 to 119 Mbps in 1 bps steps (QPSK)<br>2 to 181 Mbps in 1 bps steps (8PSK)<br>3 to 238 Mbps in 1 bps steps (16QAM) |
| Symbol Rate: | 1 to 68 Msps in 1 sps steps |
| Frame Size: | 187 payload bytes, 1 sync byte, 16 parity bytes |
| Terrestrial Framing: | 204, 188, 187 (Unframed data) |
| Randomization for Energy Dispersal: | Per EN 300-421 |
| Outer Code: | Reed-Solomon (204,188,T = 8) |
| Interleaver: | Convolutional, I = 12 |
| Inner Code: | (BPSK): 1/2, 2/3, 3/4, 5/6, 7/8<br>(QPSK): 1/2, 2/3, 3/4, 5/6, 7/8<br>(8PSK): 2/3, 5/6, 8/9<br>(16QAM): 3/4, 7/8<br>Viterbi K = 7, G1 = 171oct G2 = 133oct |
| Baseband Roll-Off: | Square Root Raised Cosine<br>0.35 (BPSK, QPSK, 8PSK, 16QAM)<br>0.25 (8PSK, 16QAM)<br>0.20 (BPSK, QPSK) |
| Terrestrial Input Clock Accuracy: | 400 ppm (Maximum) |
| Test Pattern: | Internal $2^{15}$-1 and $2^{23}$-1 Pseudo-Random Number Generators |

### 7.3.2 DVB-S2-CCM (CCM - Normative)

| | |
|---|---|
| Compliance | ETSI EN 302 307 v1.1.1 (normative) |
| Modulation Types: | QPSK, (8PSK, 16APSK & 32APSK Optional) |
| Transport Streams | Single MPEG Packetized Transport Streams |
| Data Rate: | (QPSK): 1 to 54 Mbps in 1 bps steps<br>(8PSK): 2 to 118 Mbps in 1 bps steps<br>(16APSK): 2.6 to 160 Mbps in 1 bps steps<br>(32APSK): 3.5 to 200 Mbps in 1 bps steps |
| Symbol Rate: | 1 to 45 Msps in 1 bps steps |
| Terrestrial Framing: | 188 (1 sync byte, 187 payload bytes) |
| Baseband Processing: | Per ETSI EN 302 307 v1.1.1 |
| Block Size: | 64800 bits & 16200 bits |
| FEC Code: | BCH + LDPC |
| Interleaver: | Block Interleaver, per ETSI EN 302 307 v1.1.1 |
| Inner Code Rate: | (QPSK): 1/4, 1/3, 2/5, 1/2, 2/3, 3/5, 3/4, 4/5, 5/6, 8/9, 9/10<br>(8PSK): 3/5, 2/3, 3/4, 5/6, 8/9, 9/10 Optional<br>(16APSK): 2/3, 3/4, 4/5, 5/6, 8/9, 9/10 Optional<br>(32APSK): 3/4, 4/5, 5/6, 8/9, 9/10 Optional |
| Baseband Roll-Off | Square Root Raised Cosine<br>0.20 |

| | |
|---|---|
| | 0.25<br>0.35 |
| Terrestrial Input Clock Accuracy: | 400 ppm (max) |
| Test Pattern: | Internal $2^{15}$-1 and $2^{23}$-1 Pseudo-Random Number Generators |


IMPORTANT
Consult Factory on ACM & VCM, Multiple Transport Streams and Generic Transport Streams Input Stream Synchronizer & Null Packet Deletion

### 7.3.3 DVB-S2-ACM (Normative Features with Single Transports streams)

| | |
|---|---|
| Compliance | ETSI EN 302 307 v1.1.1 (normative) |
| Modulation Types: | QPSK, (8PSK, 16APSK & 32APSK Optional) |
| Transport Streams | Single MPEG Packetized Transport Streams |
| Data Rate: | (QPSK): 1 to 54 Mbps in 1 bps steps<br>(8PSK): 2 to 118 Mbps in 1 bps steps<br>(16APSK): 2.6 to 160 Mbps in 1 bps steps<br>(32APSK): 3.5 to 200 Mbps in 1 bps steps |
| Symbol Rate: | 1 to 45 Msps in 1 sps steps |
| Terrestrial Framing: | 188 (1 sync byte, 187 payload bytes) |
| Baseband Processing: | Per ETSI EN 302 307 v1.1.1 |
| Block Size: | 64 Kbits & 16Kbits |
| FEC Code: | BCH + LDPC |
| Interleaver: | Block Interleaver, per ETSI EN 302 307 v1.1.1 |
| Inner Code Rate: | (QPSK): 1/4, 1/3, 2/5, 1/2, 2/3, 3/4, 3/5, 4/5, 5/6, 8/9, 9/10<br>(8PSK): 3/5, 2/3, 3/4, 5/6, 8/9, 9/10 Optional<br>(16APSK): 2/3, 3/4, 4/5, 5/6, 8/9, 9/10 Optional<br>(32APSK): 3/4, 4/5, 5/6, 8/9, 9/10 Optional |
| Baseband Roll-Off | Square Root Raised Cosine<br>0.20<br>0.25<br>0.35 |
| Terrestrial Input Clock Accuracy: | 400 ppm (max) |
| Test Pattern: | Internal $2^{15}$-1 and $2^{23}$-1 Pseudo-Random umber Generators |
| Dummy Frame Insertion | Yes |

***Consult Factory on ACM & VCM, Multiple Transport Streams and Generic Transport Streams Input Stream Synchronizer & Null Packet Deletion***

## 7.4 Interface Types Available (PIIC)

| | |
|---|---|
| ASI: | ASI, Serial, BNC (female) |
| ASI Out: | ASI Monitor, Serial, BNC (female) |
| RS422/RS-530 Serial | RS422 Serial, DB 25 (female) |
| RS-422 Parallel: | DVB/M2P, Parallel, RS-422, DB-25 (female) |
| LVDS Parallel: | DVB/M2P, Parallel, LVDS, DB-25 (female) |
| HSSI: | HSSI, Serial, 50 pin SCSI-2 type connector (female) |
| Ethernet | 100/1000 Base-T, RJ45 |
| Direct TV PECL | Positive Emitter coupled logic. DB 9 Female |
| G.703: | Contact factory for availability |

## 7.5 Monitor and Control

Interface: Serial RS-485 (RLLP)and RS-232 (Terminal), Ethernet 10/100 Base-T (SNMP & Web Browser)

Parameters Controlled:

IF Frequency IF Output Level IF Output On/Off Modulation Type
FEC Rate
Spectral Inversion
Data Rate Symbol Rate Roll-Off
Interface Type
Terrestrial Framing
Clock/Data Sources
Clock/Data Polarity Reference Freq Source
External Reference Freq
Test Modes Parameters Monitored:
Alarms (Major/Minor)
Stored Alarms (Major/Minor)
Faults Stored Faults

## 7.6 Environmental

| | |
|---|---|
| Prime Power | 100 to 240 VAC, 50 – 60 Hz, 40 Watts Maximum |
| Operating Temperature: | 0 to 50°C Humidity: Up to 95%, Non-condensing Storage Temperature: -20 to 70°C Humidity: Up to 99%, Non-condensing |

## 7.7 Physical

Weight: 7 lb. (3.2 Kg)

Size: 19” W x 17” D x 1.75" H (48.3 x 43.2 x 4.45 cm)

## 7.8 Options

50 Ohm IF Output (on 70/140 MHz IF)
48 VDC Operation

## 7.9 DVB-S Series Configuration

Series 100: 1 to 10 Msps, QPSK
Series 200: 1 to 45 Msps, QPSK
Series 300: 1 to 45 Msps, QPSK/8PSK
Series 400: 1 to 68 Msps, QPSK/8PSK/16QAM

### 7.9.1 DVB-S2 Series Configuration

Series 100: 1 to 10 Msps, QPSK
Series 200: 1 to 45 Msps, QPSK
Series 300: 1 to 45 Msps, QPSK/8PSK
Series 400: 1 to 45 Msps, QPSK/8PSK/16APSK/32APSK
Series 500: 1 to 45 Msps, QPSK/8PSK/16APSK/32APSK

## 7.10 Data Rates (DVB-S)

All Data Rates in Bps.

| DVB-S Series 100 | | | | | |
|---|---|---|---|---|---|
| **Modulation** | **FEC** | **MPEG** | | **Unframed** | |
| | | **Minimum** | **Maximum** | **Minimum** | **Maximum** |
| QPSK | 1/2 | 1000000 | 9215686 | 1000000 | 10000000 |
| QPSK | 2/3 | 1228758 | 12287582 | 1333333 | 13333333 |
| QPSK | 3/4 | 1382353 | 13823529 | 1500000 | 15000000 |
| QPSK | 5/6 | 1535948 | 15359477 | 1666667 | 16666667 |
| QPSK | 7/8 | 1612745 | 16127451 | 1750000 | 17500000 |

| DVB-S Series 200 | | | | | |
|---|---|---|---|---|---|
| **Modulation** | **FEC** | **MPEG** | | **Unframed** | |
| | | **Minimum** | **Maximum** | **Minimum** | **Maximum** |
| QPSK | 1/2 | 1000000 | 41470588 | 1000000 | 45000000 |
| QPSK | 2/3 | 1228758 | 55294118 | 1333333 | 60000000 |
| QPSK | 3/4 | 1382353 | 62205882 | 1500000 | 67500000 |
| QPSK | 5/6 | 1535948 | 69117647 | 1666667 | 75000000 |
| QPSK | 7/8 | 1612745 | 72573529 | 1750000 | 78750000 |

| DVB-S Series 300 | | | | | |
|---|---|---|---|---|---|
| **Modulation** | **FEC** | **MPEG** | | **Unframed** | |
| | | **Minimum** | **Maximum** | **Minimum** | **Maximum** |
| QPSK | 1/2 | 1000000 | 41470588 | 1000000 | 45000000 |
| QPSK | 2/3 | 1228758 | 55294118 | 1333333 | 60000000 |
| QPSK | 3/4 | 1382353 | 62205882 | 1500000 | 67500000 |
| QPSK | 5/6 | 1535948 | 69117647 | 1666667 | 75000000 |
| QPSK | 7/8 | 1612745 | 72573529 | 1750000 | 78750000 |
| 8PSK | 2/3 | 1843137 | 82941176 | 2000000 | 90000000 |
| 8PSK | 5/6 | 2303922 | 103676471 | 2500000 | 112500000 |
| 8PSK | 8/9 | 2419118 | 110588235 | 2625000 | 120000000 |

| DVB-S Series 400 | | | | | |
|---|---|---|---|---|---|
| **Modulation** | **FEC** | **MPEG** | | **Unframed** | |
| | | **Minimum** | **Maximum** | **Minimum** | **Maximum** |
| QPSK | 1/2 | 1000000 | 62666667 | 1000000 | 68000000 |
| QPSK | 2/3 | 1228758 | 83555556 | 1333333 | 90666667 |
| QPSK | 3/4 | 1382353 | 94000000 | 1500000 | 102000000 |
| QPSK | 5/6 | 1535948 | 104444444 | 1666667 | 113333333 |
| QPSK | 7/8 | 1612745 | 109666667 | 1750000 | 119000000 |
| 8PSK | 2/3 | 1843137 | 125333333 | 2000000 | 136000000 |
| 8PSK | 5/6 | 2303922 | 156666667 | 2500000 | 170000000 |
| 8PSK | 8/9 | 2419118 | 167111111 | 2625000 | 181333333 |
| 16QAM | 3/4 | 2764706 | 188000000 | 3000000 | 204000000 |
| 16QAM | 7/8 | 3225490 | 219333333 | 3500000 | 238000000 |

## 7.10.1 Data Rates (DVB-S2)

All Data Rates in Bps.

| DVB-S2 Series 100 | | | |
|---|---|---|---|
| **Modulation** | **FEC** | **MPEG** | |
| | | **Minimum** | **Maximum** |
| QPSK | 1/3 | 1000000 | 6564481 |
| QPSK | 2/5 | 1000000 | 7894121 |
| QPSK | 1/2 | 1000000 | 9888581 |
| QPSK | 3/5 | 1188304 | 11883041 |
| QPSK | 2/3 | 1322253 | 13222530 |
| QPSK | 3/4 | 1487473 | 14874731 |
| QPSK | 4/5 | 1587196 | 15871961 |
| QPSK | 5/6 | 1654663 | 16546630 |
| QPSK | 8/9 | 1766451 | 17664512 |
| QPSK | 9/10 | 1788612 | 17886119 |

*Normal Frame size (64800) no pilot insertion

| DVB-S2 Series 200 | | | |
|---|---|---|---|
| **Modulation** | **FEC** | **MPEG** | |
| | | **Minimum** | **Maximum** |
| QPSK | 1/3 | 1000000 | 29540166 |
| QPSK | 2/5 | 1000000 | 35523546 |
| QPSK | 1/2 | 1000000 | 44498615 |
| QPSK | 3/5 | 1188304 | 53473684 |
| QPSK | 2/3 | 1322253 | 59501385 |
| QPSK | 3/4 | 1487473 | 66936288 |
| QPSK | 4/5 | 1587196 | 71423823 |
| QPSK | 5/6 | 1654663 | 74459834 |
| QPSK | 8/9 | 1766451 | 79490305 |
| QPSK | 9/10 | 1788612 | 80487535 |

*Normal Frame size (64800) no pilot insertion

| DVB-S2 Series 300 | | | |
|---|---|---|---|
| **Modulation** | **FEC** | **MPEG** | |
| | | **Minimum** | **Maximum** |
| QPSK | 1/2 | 1000000 | 44498615 |
| QPSK | 3/5 | 1188304 | 53473684 |
| QPSK | 2/3 | 1322253 | 59501385 |
| QPSK | 3/4 | 1487473 | 66936288 |
| QPSK | 4/5 | 1587196 | 71423823 |
| QPSK | 5/6 | 1654663 | 74459834 |
| QPSK | 8/9 | 1766451 | 79490305 |
| QPSK | 9/10 | 1788612 | 80487535 |
| 8PSK | 3/5 | 1779991 | 80099585 |
| 8PSK | 2/3 | 1980636 | 89128631 |
| 8PSK | 3/4 | 2228124 | 100265560 |
| 8PSK | 5/6 | 2478562 | 111535270 |
| 8PSK | 8/9 | 2646012 | 119070539 |
| 8PSK | 9/10 | 2679207 | 120564315 |

*Normal Frame size (64800) no pilot insertion

| DVB-S2 Series 400 | | | |
|---|---|---|---|
| **Modulation** | **FEC** | **MPEG** | |
| | | **Minimum** | **Maximum** |
| QPSK | 1/2 | 1000000 | 44498615 |
| QPSK | 3/5 | 1188304 | 53473684 |
| QPSK | 2/3 | 1322253 | 59501385 |
| QPSK | 3/4 | 1487473 | 66936288 |
| QPSK | 4/5 | 1587196 | 71423823 |
| QPSK | 5/6 | 1654663 | 74459834 |
| QPSK | 8/9 | 1766451 | 79490305 |
| QPSK | 9/10 | 1788612 | 80487535 |
| 8PSK | 3/5 | 1779991 | 80099585 |
| 8PSK | 2/3 | 1980636 | 89128631 |
| 8PSK | 3/4 | 2228124 | 100265560 |
| 8PSK | 5/6 | 2478562 | 111535270 |
| 8PSK | 8/9 | 2646012 | 119070539 |
| 8PSK | 9/10 | 2679207 | 120564315 |

| | | | |
|---|---|---|---|
| 16APSK | 2/3 | 2637201 | 118674033 |
| 16APSK | 3/4 | 2966728 | 133502762 |
| 16APSK | 4/5 | 3165623 | 142453039 |
| 16APSK | 5/6 | 3300184 | 148508287 |
| 16APSK | 8/9 | 3523143 | 158541436 |
| 16APSK | 9/10 | 3567342 | 160530387 |

*Normal Frame size (64800) no pilot insertion

| **DVB-S2 Series 500** | | | |
|---|---|---|---|
| **Modulation** | **FEC** | **MPEG** | |
| | | **Minimum** | **Maximum** |
| QPSK | 1/2 | 1000000 | 44498615 |
| QPSK | 3/5 | 1188304 | 53473684 |
| QPSK | 2/3 | 1322253 | 59501385 |
| QPSK | 3/4 | 1487473 | 66936288 |
| QPSK | 4/5 | 1587196 | 71423823 |
| QPSK | 5/6 | 1654663 | 74459834 |
| QPSK | 8/9 | 1766451 | 79490305 |
| QPSK | 9/10 | 1788612 | 80487535 |
| 8PSK | 3/5 | 1779991 | 80099585 |
| 8PSK | 2/3 | 1980636 | 89128631 |
| 8PSK | 3/4 | 2228124 | 100265560 |
| 8PSK | 5/6 | 2478562 | 111535270 |
| 8PSK | 8/9 | 2646012 | 119070539 |
| 8PSK | 9/10 | 2679207 | 120564315 |
| 16APSK | 2/3 | 2637201 | 118674033 |
| 16APSK | 3/4 | 2966728 | 133502762 |
| 16APSK | 4/5 | 3165623 | 142453039 |
| 16APSK | 5/6 | 3300184 | 148508287 |
| 16APSK | 8/9 | 3523143 | 158541436 |
| 16APSK | 9/10 | 3567342 | 160530387 |
| 32APSK | 3/4 | 3703295 | 166648276 |
| 32APSK | 4/5 | 3951571 | 177820690 |
| 32APSK | 5/6 | 4119540 | 185379310 |
| 32APSK | 8/9 | 4397854 | 197903448 |
| 32APSK | 9/10 | 4453027 | 200386207 |

**Notes:**

# Chapter 8. SNMP

```
-- ____________________________________________________________________________
--  $RCSfile: hsmmib.txt $
--  $Revision: 1.17 $
--  $Date: 2011/08/16 14:28:40 $
--  $Author: edarosa $
--
-- Module Organization :
--     This is a PRILIMINARY document whose contents are subject to change
--     without prior notice.
--     Radyne user MIB Object Identifiers description. The privite entereprise
--     number 2591 is a unique identifier assigned to Radyne by the Internet
--     Assigned Numbers Authority (IANA). This number is used to uniquely
--     define vendor specific information such as private MIBs.
--
-- Program Units       : (list of program units)
--
-- Requirements Trace  : (document(s) and paragraph reference)
--
-- Deviations          : (any deviations from the coding standard)
--
-- Revision History    : adapted from 3030/3030L usermib
-- ____________________________________________________________________________


RADYNE-MIB DEFINITIONS ::= BEGIN

   IMPORTS
      enterprises
         FROM RFC1155-SMI
      TEXTUAL-CONVENTION
         FROM SNMPv2-TC
      OBJECT-TYPE
         FROM RFC-1212
      DisplayString
         FROM RFC1213-MIB;

   -- groups in Radyne specific MIB

   radyne  OBJECT IDENTIFIER ::= { enterprises 2591 }
   dvb3030 OBJECT IDENTIFIER ::= { radyne 1 }
   radSNMPModNVStatus OBJECT IDENTIFIER ::= { dvb3030 1 }
   radSNMPModStatus   OBJECT IDENTIFIER ::= { dvb3030 2 }

   RadPowerLevel ::= TEXTUAL-CONVENTION
      DISPLAY-HINT    "d-1"
      STATUS          current
      DESCRIPTION
         "Power level in tenths of a dBm."
      SYNTAX          INTEGER

   RadVoltageLevel ::= TEXTUAL-CONVENTION
      DISPLAY-HINT    "d-1"
      STATUS          current
```

```
      DESCRIPTION
         "Voltage level in tenths of a volt."
      SYNTAX         INTEGER

   RadString ::= TEXTUAL-CONVENTION
      DISPLAY-HINT    "255a"
      STATUS         current
      DESCRIPTION
         "ASCII String."
      SYNTAX         OCTET STRING

   RadInterfaceCardType ::= TEXTUAL-CONVENTION
      STATUS         current
      DESCRIPTION
         "Terrestrial interface card type."
      SYNTAX         INTEGER{
         v1InSerialRs422(      '01'h),
         v1InDirecTV(          '02'h),
         v1InG703(             '83'h),
         v1InHssi(             '84'h),
         v1InAsiParallelRs422( '07'h),
         v1InAsiParallelLvds(  '08'h),
         v1InIpsat(            '89'h),
         piicInAsi(            '93'h),
         piicInParallelRs422(  '94'h),
         piicInParallelLvds(   '95'h),
         piicInHssi(           '96'h),
         piicInG703E1T1(       '98'h),
         piicInG703E2T2(       '99'h),
         piicInG703E3T3Sts1(   '9A'h),
         piicInSerialRs422(    '9B'h),
         piicInDirecTVAmc(     '9C'h),
         piicInGigEthernet(    '9D'h),
         piicOutAsi(           'D3'h),
         none(                 'ff'h)
      }

   RadRadioFreqHz ::= TEXTUAL-CONVENTION
      DISPLAY-HINT    "d"
      STATUS         current
      DESCRIPTION
         "Radio Frequency in Hz."
      SYNTAX         OCTET STRING

   radCarrierControl OBJECT-TYPE
      SYNTAX  INTEGER {
         off(0),
         on(1)
      }
      ACCESS  read-write
      STATUS  current
      DESCRIPTION
         "Turns carrier on and off"
      ::= { radSNMPModNVStatus 1 }

   radTransmitPower OBJECT-TYPE
      SYNTAX  RadPowerLevel (-300..50)
      ACCESS  read-write
      STATUS  current
      DESCRIPTION
         "Selects the Tx power level in tenths of dBm
         from +5.0 to -20.0 (70/140MHz),
         from -5.0 to -30.0 (L-Band).
         from +0.0 to -25.0 (DM240XR 70/140MHz and L-Band).
         There is an implied decimal point. For example, a value
         of 39 represents a transmit power level of +3.9 dBm."
      ::= { radSNMPModNVStatus 2 }

   radIFFrequency OBJECT-TYPE
      SYNTAX INTEGER (50000000..180000000|950000000..2050000000)
      ACCESS  read-write
      STATUS  current
      DESCRIPTION
         "Selects IF frequency in Hz."
```

```
    ::= { radSNMPModNVStatus 3 }

radDataRate OBJECT-TYPE
    SYNTAX  INTEGER (0..238000000)
    ACCESS  read-write
    STATUS  current
    DESCRIPTION
        "Selects the data rate in bps.  Note: Changing data rate
        will affect symbol rate, see comment at the end of
        mibtext."
    ::= { radSNMPModNVStatus 4 }

radSymbolRate OBJECT-TYPE
    SYNTAX  INTEGER (0..68000000)
    ACCESS  read-write
    STATUS  current
    DESCRIPTION
        "Selects the symbol rate in sps."
    ::= { radSNMPModNVStatus 5 }

radSymbolRateMode OBJECT-TYPE
    SYNTAX  INTEGER {
        variable(0),
        fixed(1)
    }
    ACCESS  read-write
    STATUS  optional
    DESCRIPTION
        "Selects symbol rate mode. This can only be modified if
        the factory configuration is set to both variable and
        fixed.
        This is obsolete."
    ::= { radSNMPModNVStatus 6 }

radStrapCode OBJECT-TYPE
    SYNTAX  INTEGER (0..65535)
    ACCESS  read-write
    STATUS  optional
    DESCRIPTION
        "The strap code is a quick set key that sets many modem
        parameters.
        Not implemented."
    ::= { radSNMPModNVStatus 7 }

radConvolutionalEncoder OBJECT-TYPE
    SYNTAX  INTEGER {
        none(0),
        ifecRate1x2(1),
        ifecRate2x3(2),
        ifecRate3x4(3),
        ifecRate5x6(4),
        ifecRate7x8(5),
        ifecRate6x7(6),
        ifecRate4x5(7),
        ifecRate8x9(8),
        ifecRate9x10(9),
        ifecRate1x4(128),
        ifecRate1x3(129),
        ifecRate2x5(130),
        ifecRate3x5(131)
    }
    ACCESS  read-write
    STATUS  current
    DESCRIPTION
        "Selects Tx code rate and type.
        Note: Changing the convolutional encoder will affect
        symbol rate and data rate. See note at the end of this
        section. Unsupported choices include:
            none
            viterbi6x7
        "
    ::= { radSNMPModNVStatus 8 }

radClockControl OBJECT-TYPE
```

```
        SYNTAX  INTEGER {
            scte(0),
            sct(1),
            none(2)
        }
        ACCESS  read-write
        STATUS  current
        DESCRIPTION
            "Selects Tx clock source. 0 selects terrestrial clock
            (SCTE), 1 selects internal clock (SCT). Modulators using
            ASI or G.703 interface options must use SCTE at all
            times."
        ::= { radSNMPModNVStatus 9 }

    radFramingMode  OBJECT-TYPE
        SYNTAX  INTEGER {
            framing188Byte    (0),
            framing204Byte    (1),
            framingNone       (2),
            framingDirecPc    (3),
            framingDirecTv    (4),
            framingProMpegCop3 (5),
            framingProMpegAcm  (6),
            framingBridge     (7),
            framingDssOverIP   (8)
        }
        ACCESS  read-write
        STATUS  current
        DESCRIPTION
            "Selects the frame transport stream input type.
            Note: Changing the framing mode will affect the symbol
            rate and/or data rate. See note at the end of this
            section."
        ::= { radSNMPModNVStatus 10 }

    radRolloff OBJECT-TYPE
        SYNTAX  INTEGER {
            rolloff0point35 (0),
            rolloff0point20 (1),
            rolloff0point25 (25)
        }
        ACCESS  read-write
        STATUS  current
        DESCRIPTION
            "0   selects alpha factor rolloff of 0.35,
            '1'  selects alpha factor rolloff of 0.20,
            '25' selects alpha factor rolloff of 0.25"
        ::= { radSNMPModNVStatus 11}

    radFreqReferenceSource OBJECT-TYPE
        SYNTAX  INTEGER {
            internal(0),
            external(1)
        }
        ACCESS  read-write
        STATUS  current
        DESCRIPTION
            "Selects internal or external reference clock"
        ::= { radSNMPModNVStatus 12 }

    radExternalReference OBJECT-TYPE
        SYNTAX  INTEGER (256000..10000000)
        ACCESS  read-write
        STATUS  current
        DESCRIPTION
            "Selects the external reference frequency in Hz with a
            8000Hz step size."
        ::= { radSNMPModNVStatus 13 }

    radInterfaceType OBJECT-TYPE
        SYNTAX  INTEGER {
            serial(0),
            asiNorm(2),
            asiNull(3),
```

```
            g703E3(4),
            g703T3(5),
            sts1(6),
            hssi(7),
            parallelDVB(8),
            parallelM2P(9),
            none(10),
            directv(11),
            oc3(13),
            stm1(14),
            g703E2(15),
            g703T2Bal(16),
            g703T2Unbal(17),
            g703E1Bal(18),
            g703E1Unbal(19),
            g703T1AMI(20),
            g703T1B8ZS(21),
            gigEthernet(22)
        }
        ACCESS  read-write
        STATUS  current
        DESCRIPTION
            "Selects the various interface types.
            The following choices are not supported:
                none(10),
                oc3(13),
                stm1(14)
            Note: Selecting interface types Parallel DVB,
            Parallel M2P, Serial, DirecTv or HSSI will force the
            outclock selection to SCT. Selecting interface type
            ASI Norm or ASI Null causes the outclock selection to
            be forced to None.
            "
        ::= { radSNMPModNVStatus 14 }

    radClockPolarity OBJECT-TYPE
        SYNTAX  INTEGER {
            normal(0),
            inverted(1)
        }
        ACCESS  read-write
        STATUS  current
        DESCRIPTION
            "Selects clock polarity for Tx terrestrial clock
            relative to Tx data."
        ::= { radSNMPModNVStatus 15 }

    radDataPolarity OBJECT-TYPE
        SYNTAX  INTEGER {
            normal(0),
            inverted(1)
        }
        ACCESS  read-write
        STATUS  current
        DESCRIPTION
            "Selects data polarity"
        ::= { radSNMPModNVStatus 16}

    radSpectrum OBJECT-TYPE
        SYNTAX  INTEGER {
            inverted(0),
            normal(1)
        }
        ACCESS  read-write
        STATUS  current
        DESCRIPTION
            "Inverts the symbol mapping direction of rotation."
        ::= { radSNMPModNVStatus 17 }

    radModulationType OBJECT-TYPE
        SYNTAX  INTEGER {
            qpsk(0),
            bpsk(1),
            psk8(2),
```

```
        qam16(3),
        apsk16(9),
        apsk32(10)
    }
    ACCESS  read-write
    STATUS  current
    DESCRIPTION
        "Selects the modulation type.
        Note: Changing modulation type will affect the symbol
        rate and data rate. See note at the end of this section."
    ::= { radSNMPModNVStatus 18}

radFraming OBJECT-TYPE
    SYNTAX  INTEGER {
        dvb(0)
    }
    ACCESS  read-write
    STATUS  optional
    DESCRIPTION
        "This selection is reserved and is superceeded by satFraming. Please refer
         to radSNMPModNVStatus.69 for more information."
    ::= { radSNMPModNVStatus 19 }

radReedsolomon OBJECT-TYPE
    SYNTAX  INTEGER {
        disable(0),
        enable(1)
    }
    ACCESS  read-write
    STATUS  current
    DESCRIPTION
        "Enables the ReedSolomon encoder. Reserved"
    ::= { radSNMPModNVStatus 20 }

radScramblerControl OBJECT-TYPE
    SYNTAX  INTEGER {
        disable(0),
        enable(1)
    }
    ACCESS  read-write
    STATUS  current
    DESCRIPTION
        "Enables scrambler operation"
    ::= { radSNMPModNVStatus 21 }

radScramblerType OBJECT-TYPE
    SYNTAX  INTEGER {
        dvb(0)
    }
    ACCESS  read-write
    STATUS  optional
    DESCRIPTION
        "Selects scrambler type.
        Not implemented"
    ::= { radSNMPModNVStatus 22 }

radDifferentialEncoder OBJECT-TYPE
    SYNTAX  INTEGER {
        off(0)
    }
    ACCESS  read-write
    STATUS  optional
    DESCRIPTION
        "Disables differential encoder
        unsupported
        "
    ::= { radSNMPModNVStatus 23 }

radAlarmMaskEnable OBJECT-TYPE
    SYNTAX  INTEGER {
        disable(0),
        enable(1)
    }
    ACCESS  read-write
```

```
        STATUS  optional
        DESCRIPTION
            "unsupported"
        ::= { radSNMPModNVStatus 24 }

    radMajorAlarmMask OBJECT-TYPE
        SYNTAX  INTEGER (0..255)
        ACCESS  read-write
        STATUS  current
        DESCRIPTION
            "Major Alarm mask:
            A bit field. 0 = MASKED, 1 = UNMASKED
            Bit 0 = Stream
            Bit 1 = Oversample Clock PLL Lock
            Bit 2 = FPGA Configuration Error
            Bit 3 = Synthesis Clock PLL Lock
            Bit 4 = External Reference PLL Lock
            Bit 5 = Composite PLL Lock
            Bit 6 = Symbol PLL Lock
            Bit 7 = Invalid Terrestrial Interface
            "
        ::= { radSNMPModNVStatus 25 }

    radMinorAlarmMask OBJECT-TYPE
        SYNTAX  INTEGER (0..255)
        ACCESS  read-write
        STATUS  current
        DESCRIPTION
            "Minor Alarm mask:
            A bit field. 0 = MASKED, 1 = UNMASKED
            Bit 0 = Terr Ethernet data activity detect
            Bit 1 = Terrestrial clock activity detect
            Bit 2 = Tx data activity detect
            Bit 3 = FIFO overflow/underflow error
            Bit 4 = Output Level
            Bit 5 = Loss of frame synchronization
            Bit 6 = Terr Ethernet jitter buffer underflow
            Bit 7 = Terr Ethernet jitter buffer overflow
            "
        ::= { radSNMPModNVStatus 26 }

    radCommonAlarmMask OBJECT-TYPE
        SYNTAX  INTEGER (0..255)
        ACCESS  read-write
        STATUS  current
        DESCRIPTION
            "Common Alarm mask:
            A bit field. 0 = MASKED, 1 = UNMASKED
            Bit 0 = -12V alarm.
            Bit 1 = +12V alarm.
            Bit 2 = +5V  alarm.
            "
        ::= { radSNMPModNVStatus 27 }

    radOperatingMode OBJECT-TYPE
        SYNTAX  INTEGER {
            normal(0),
            testPattern2to15Minus1(1),
            testPattern2to23Minus1(23)
        }
        ACCESS  read-write
        STATUS  current
        DESCRIPTION
            "Test Pattern Operating Mode:
            None,
            (2^15)-1,
            (2^23)-1
            "
        ::= { radSNMPModNVStatus 28 }

    radCarrierTest OBJECT-TYPE
        SYNTAX  INTEGER {
            normal(0),
            cw(1),
```

```
            dual(2),
            offset(3),
            posfir(4),
            negfir(5)
        }
        ACCESS  read-write
        STATUS  current
        DESCRIPTION
            "normal, allows normal modulated data output
            cw, causes the modulator to output pure carrier
            dual, causes a double sideband output
            offset, causes a single side band output
            posfir, uses a positive FIR
            negfir, uses a negative FIR"
        ::= { radSNMPModNVStatus 29 }

    radCircuitID OBJECT-TYPE
        SYNTAX  RadString (SIZE (11))
        ACCESS  read-write
        STATUS  optional
        DESCRIPTION
            "Provides entry of Tx circuit identifier. Circuits can
            be given up to 11 character alphanumeric identity such
            as LINK1. Not implemented."
        ::= { radSNMPModNVStatus 30 }

    radControlMode OBJECT-TYPE
        SYNTAX  INTEGER {
            local(0),
            terminal(1),
            computer(2),
            ethernet(3)
        }
        ACCESS  read-write
        STATUS  optional
        DESCRIPTION
            "Selects the active control source.
            This is obsolete."
        ::= { radSNMPModNVStatus 31 }

    radMode  OBJECT-TYPE
        SYNTAX  INTEGER {
            dvb(0),
            direcPc(1),
            direcTv(9),
            dvbs2BsNbc(11),
            dvbs2BsBc(12),
            direcTvAmcNbc(13)
            direcTvAmcBc(14),
            dvbs2Nbs(15)
        }
        ACCESS  read-write
        STATUS  current
        DESCRIPTION
            "Selects the network specification."
        ::= { radSNMPModNVStatus 32 }

    radInterleaver  OBJECT-TYPE
        SYNTAX  INTEGER {
            enable(0),
            disable(1)
        }
        ACCESS  read-write
        STATUS  current
        DESCRIPTION
            "Enables or disables the interleaver."
        ::= { radSNMPModNVStatus 33 }

    radOutClockSelection  OBJECT-TYPE
        SYNTAX  INTEGER {
            scte(0),
            sct(1),
            none(2)
        }
```

```
        ACCESS  read-write
        STATUS  current
        DESCRIPTION
            "Selects the source of clock output from the Terrestrial
            Interface. See the Clock Source Selection Matrix."
        ::= { radSNMPModNVStatus 34 }

    radLastRateControl  OBJECT-TYPE
        SYNTAX  INTEGER {
            symbol(0),
            data(1),
            auto(2)
        }
        ACCESS  read-write
        STATUS  current
        DESCRIPTION
            "Allows the modulator to behave with symbol rate or data
            rate precedence based on the selection.
            See rate control notes."
        ::= { radSNMPModNVStatus 35 }

    radClearLatchedAlarms  OBJECT-TYPE
        SYNTAX  INTEGER {
            clearAlarms(1)
        }
        ACCESS  read-write
        STATUS  current
        DESCRIPTION
            "Clears all latched alarms."
        ::= { radSNMPModNVStatus 36 }

    radPcrRestamping OBJECT-TYPE
        SYNTAX  INTEGER {
            off(0),
            on(1)
        }
        ACCESS  read-write
        STATUS  current
        DESCRIPTION
            "Enables the PCR restamping in AASI."
        ::= { radSNMPModNVStatus 37 }

    radMultiPiicMode OBJECT-TYPE
        SYNTAX  INTEGER {
            manual(1),
            redundancy(2)
        }
        ACCESS  read-write
        STATUS  current
        DESCRIPTION
            "Selects the Multi-PIIC mode."
        ::= { radSNMPModNVStatus 38 }

    radRedundancyMode OBJECT-TYPE
        SYNTAX  INTEGER {
            forcePrime(0),
            forceBackup(1),
            manualRevert(2),
            autoRevert(3)
        }
        ACCESS  read-write
        STATUS  current
        DESCRIPTION
            "Selects the Redundancy submode if the Multi-PIIC mode
            is redundancy."
        ::= { radSNMPModNVStatus 39 }

    radPrimePiicSlot OBJECT-TYPE
        SYNTAX  INTEGER
        ACCESS  read-write
        STATUS  current
        DESCRIPTION
            "If the Multi-PIIC mode is manual, radPrimePiicSlot
            selects the input slot.
```

```
        If the Multi-PIIC mode is redundancy, radPrimePiicSlot
        selects the prime input slot."
    ::= { radSNMPModNVStatus 40 }

radBackupPiicSlot OBJECT-TYPE
    SYNTAX  INTEGER
    ACCESS  read-write
    STATUS  current
    DESCRIPTION
        "If the Multi-PIIC mode is redundancy, radBackupPiicSlot
        selects the backup input slot."
    ::= { radSNMPModNVStatus 41 }

radRadioFrequencyHz OBJECT-TYPE
    SYNTAX  Counter64
    ACCESS  read-write
    STATUS  current
    DESCRIPTION
        "Selects RF frequency in Hz."
    ::= { radSNMPModNVStatus 42 }

radLoFrequencyHz OBJECT-TYPE
    SYNTAX  Counter64
    ACCESS  read-write
    STATUS  current
    DESCRIPTION
        "Selects LO frequency in Hz."
    ::= { radSNMPModNVStatus 43 }

radLowSideMix OBJECT-TYPE
    SYNTAX  INTEGER {
        highSide(0),
        lowSide(1)
    }
    ACCESS  read-write
    STATUS  current
    DESCRIPTION
        "Selects the high-side/low-side LO mix."
    ::= { radSNMPModNVStatus 44 }

radLocalIpAddress OBJECT-TYPE
    SYNTAX  IpAddress
    ACCESS  read-write
    STATUS  current
    DESCRIPTION
        "Selects the local IP address."
    ::= { radSNMPModNVStatus 45 }

radPilotSymbolsEnabled OBJECT-TYPE
    SYNTAX  INTEGER {
        disable(0),
        enable(1)
    }
    ACCESS  read-write
    STATUS  current
    DESCRIPTION
        "Enables/disables pilot symbols at the physical layer."
    ::= { radSNMPModNVStatus 46 }

radPhysLayerScramblerBypass OBJECT-TYPE
    SYNTAX  INTEGER {
        normal(0),
        bypassed(1)
    }
    ACCESS  read-write
    STATUS  current
    DESCRIPTION
        "Enables/disables the physical layer scrambler. The
        modulator is considered in a test mode when the
        scrambler is bypassed."
    ::= { radSNMPModNVStatus 47 }

radInnerFecBypass OBJECT-TYPE
    SYNTAX  INTEGER {
```

```
            normal(0),
            bypassed(1)
        }
        ACCESS  read-write
        STATUS  current
        DESCRIPTION
            "Enables/disables the inner forward error correction.
            The modulator is considered in a test mode when the
            inner FEC is bypassed."
        ::= { radSNMPModNVStatus 48 }

    radRfSwitchRedundancyMode OBJECT-TYPE
        SYNTAX  INTEGER {
            manual(1),
            autoRevert(2),
            backup(3)
        }
        ACCESS  read-write
        STATUS  current
        DESCRIPTION
            "If the modulator is connected to the prime
            side of the switch then manual and
            auto revert modes are available. Otherwise,
            if modulator is connected to backup side
            then only manual and backup modes are
            available."
        ::= { radSNMPModNVStatus 49 }

    radRfSwitchActivateSide OBJECT-TYPE
        SYNTAX  INTEGER {
            primary(1),
            backup(2)
        }
        ACCESS  read-write
        STATUS  current
        DESCRIPTION
            "Activates the primary or backup side of
            the RF switch."
        ::= { radSNMPModNVStatus 50 }

    radRfSwitchFaultTestMode OBJECT-TYPE
        SYNTAX  INTEGER {
            normal(1),
            faulted(2)
        }
        ACCESS  read-write
        STATUS  current
        DESCRIPTION
            "Allows the assertion of the fault signal
            to the RF switch for test purposes"
        ::= { radSNMPModNVStatus 51 }

    radPhaseNoiseGeneratorEnabled OBJECT-TYPE
        SYNTAX  INTEGER {
            disable(0),
            enable(1)
        }
        ACCESS  read-write
        STATUS  current
        DESCRIPTION
            "Enables/disables the phase noise generator."
        ::= { radSNMPModNVStatus 52 }

    radPhaseNoiseProfileIndex OBJECT-TYPE
        SYNTAX  INTEGER (1..16)
        ACCESS  read-write
        STATUS  current
        DESCRIPTION
            "Selects the phase noise profile."
        ::= { radSNMPModNVStatus 53 }

    radPlHeaderScramblerSeqIndex OBJECT-TYPE
        SYNTAX  INTEGER (0..2000)
        ACCESS  read-write
```

```
    STATUS  current
    DESCRIPTION
        "Selects the directv physical layer header scrambler
        sequence index."
    ::= { radSNMPModNVStatus 54 }

radGoldCodeSeqIndex OBJECT-TYPE
    SYNTAX  INTEGER (0..262142)
    ACCESS  read-write
    STATUS  current
    DESCRIPTION
        "Selects the gold code sequence index."
    ::= { radSNMPModNVStatus 55 }

radTerrEthMode OBJECT-TYPE
    SYNTAX  INTEGER {
        udp(0),
        cop3(1),
        cop3Fec(2)
    }
    ACCESS  read-write
    STATUS  current
    DESCRIPTION
        "Selects mode for the Gig Ethernet card."
    ::= { radSNMPModNVStatus 56}

radTerrEthSelect OBJECT-TYPE
    SYNTAX  INTEGER {
        prime(0),
        backup(1)
    }
    ACCESS  read-write
    STATUS  current
    DESCRIPTION
        "Selects prime or backup for the Gig Ethernet card."
    ::= { radSNMPModNVStatus 57 }

radTerrEthJitterSz OBJECT-TYPE
    SYNTAX  INTEGER (1..20)
    ACCESS  read-write
    STATUS  current
    DESCRIPTION
        "Selects the jitter buffer size in 10ms steps."
    ::= { radSNMPModNVStatus 58 }

radTerrEthJitterTrack OBJECT-TYPE
    SYNTAX  INTEGER {
        widest(0),
        wide(1),
        midLevel(2),
        narrow(3),
        narrowest(4)
    }
    ACCESS  read-write
    STATUS  current
    DESCRIPTION
        "Selects the jitter tracking value from wide to narrow."
    ::= { radSNMPModNVStatus 59 }

radTerrEthRevert OBJECT-TYPE
    SYNTAX  INTEGER {
        manual(0),
        auto(1)
    }
    ACCESS  read-write
    STATUS  current
    DESCRIPTION
        "Selects the backup mode for the Gig Ethernet card."
    ::= { radSNMPModNVStatus 60 }

radTerrEthBkupDly OBJECT-TYPE
    SYNTAX  INTEGER (1..20)
    ACCESS  read-write
    STATUS  current
```

```
    DESCRIPTION
      "Selects the backup delay in 100ms steps for the Gig Ethernet card."
    ::= { radSNMPModNVStatus 61 }

radTerrEthAddrPrime OBJECT-TYPE
    SYNTAX  IpAddress
    ACCESS  read-write
    STATUS  current
    DESCRIPTION
      "Selects the prime IP address for the Gig Ethernet card."
    ::= { radSNMPModNVStatus 62 }

radTerrEthUdpPortPrime OBJECT-TYPE
    SYNTAX  INTEGER (0..65535)
    ACCESS  read-write
    STATUS  current
    DESCRIPTION
      "Selects the prime UDP port for the Gig Ethernet card."
    ::= { radSNMPModNVStatus 63 }

radTerrEthSourcePrime OBJECT-TYPE
    SYNTAX  IpAddress
    ACCESS  read-write
    STATUS  current
    DESCRIPTION
      "Selects the prime source IP address for the Gig Ethernet card."
    ::= { radSNMPModNVStatus 64 }

radTerrEthAddrBackup OBJECT-TYPE
    SYNTAX  IpAddress
    ACCESS  read-write
    STATUS  current
    DESCRIPTION
      "Selects the backup IP address for the Gig Ethernet card."
    ::= { radSNMPModNVStatus 65 }

radTerrEthUdpPortBackup OBJECT-TYPE
    SYNTAX  INTEGER (0..65535)
    ACCESS  read-write
    STATUS  current
    DESCRIPTION
      "Selects the backup UDP port for the Gig Ethernet card."
    ::= { radSNMPModNVStatus 66 }

radTerrEthSourceBackup OBJECT-TYPE
    SYNTAX  IpAddress
    ACCESS  read-write
    STATUS  current
    DESCRIPTION
      "Selects the backup source IP address for the Gig Ethernet card."
    ::= { radSNMPModNVStatus 67 }

radTerrEthAddrUnicast OBJECT-TYPE
    SYNTAX  IpAddress
    ACCESS  read-write
    STATUS  current
    DESCRIPTION
      "Selects the Unicast IP address for the Gig Ethernet card."
    ::= { radSNMPModNVStatus 68 }

radSatFraming OBJECT-TYPE
    SYNTAX  INTEGER {
      dvbs(0),
      dvbs2Normal(1),
      dvbs2Short(2),
      dssDtv(3)
    }
    ACCESS  read-write
    STATUS  current
    DESCRIPTION
      "Selects the satellite framing. SatFraming is valid in every radMode
       (networkSpec), except DVB-S2-NBS. In that configuration, the framing
       is automatically determined by the incoming stream."
    ::= { radSNMPModNVStatus 69 }
```

```
    radServerIpAddr OBJECT-TYPE
        SYNTAX  IpAddress
        ACCESS  read-write
        STATUS  current
        DESCRIPTION
            "Selects the IP address for the SNMP Trap Server."
        ::= { radSNMPModNVStatus 70 }

    radStreamAlarmPeriod OBJECT-TYPE
      SYNTAX      INTEGER (0..59)
      ACCESS      read-write
      STATUS              current
      DESCRIPTION
          "The number of seconds (1-59) an invalid ASI or Ethernet stream
          exists before the stream alarm is asserted, 0 indicates never,
          i.e., masked."
       ::= { radSNMPModNVStatus 71 }

    radSystemReboot OBJECT-TYPE
      SYNTAX      INTEGER
      ACCESS      read-write
      STATUS              current
      DESCRIPTION
          "Any write reboots the system"
       ::= { radSNMPModNVStatus 72 }

    radUnitID OBJECT-TYPE
        SYNTAX  RadString (SIZE (15))
        ACCESS  read-write
        STATUS          current
        DESCRIPTION
            "Provides entry of Tx unit identifier. Units can
            be given up to 15 character alphanumeric identity such
            as UNIT1."
        ::= { radSNMPModNVStatus 73 }

    radTxEqEnable OBJECT-TYPE
        SYNTAX  INTEGER {
            disable(0),
            enable(1)
        }
        ACCESS  read-write
        STATUS  current
        DESCRIPTION
            "Enables the Tx Equalizer."
        ::= { radSNMPModNVStatus 74 }

    radTxEqFilterName OBJECT-TYPE
        SYNTAX  RadString (SIZE (8))
        ACCESS  read-write
        STATUS          current
        DESCRIPTION
            "Name of the Tx Equalizer Filter. The filter selected can
            have up to 8 alphanumeric characters such as CARRIER1."
        ::= { radSNMPModNVStatus 75 }

--------------------------------------------------------------------------------
-- Status information out of Radyne specific MIB

    radMajorAlarmStatus OBJECT-TYPE
        SYNTAX  INTEGER (0..255)
        ACCESS  read-only
        STATUS  current
        DESCRIPTION
            "Major Alarm status:
            A bit field. 0 = PASS, 1 = FAIL
            Bit 0 = Stream
            Bit 1 = Oversample Clock PLL Lock
            Bit 2 = FPGA Configuration Error
            Bit 3 = Synthesis Clock PLL Lock
            Bit 4 = External Reference PLL Lock
            Bit 5 = Composite PLL Lock
            Bit 6 = Symbol PLL Lock
```

```
        Bit 7 = Invalid Terrestrial Interface
        "
    ::= { radSNMPModStatus 1 }

radMinorAlarmStatus OBJECT-TYPE
    SYNTAX  INTEGER (0..255)
    ACCESS  read-only
    STATUS  current
    DESCRIPTION
        "Minor Alarm status:
        A bit field. 0 = PASS, 1 = FAIL
        Bit 0 = Terr Ethernet data activity detect
        Bit 1 = Terrestrial clock activity detect
        Bit 2 = Tx data activity detect
        Bit 3 = FIFO overflow/underflow error
        Bit 4 = Output Level
        Bit 5 = Loss of frame synchronization
        Bit 6 = Terr Ethernet jitter buffer underflow
        Bit 7 = Terr Ethernet jitter buffer overflow
        "
    ::= { radSNMPModStatus 2 }

radCommonAlarmStatus OBJECT-TYPE
    SYNTAX  INTEGER (0..255)
    ACCESS  read-only
    STATUS  current
    DESCRIPTION
        "Common Alarm status:
        A bit field. 0 = PASS, 1 = FAIL
        Bit 0 = -12V alarm.
        Bit 1 = +12V alarm.
        Bit 2 = +5V  alarm.
        "
    ::= { radSNMPModStatus 3 }

radLatchedMajorAlarmStatus OBJECT-TYPE
    SYNTAX  INTEGER (0..255)
    ACCESS  read-only
    STATUS  current
    DESCRIPTION
        "Major Alarm latched status:
        A bit field. 0 = PASS, 1 = FAIL
        Bit 0 = Stream
        Bit 1 = Oversample Clock PLL Lock
        Bit 2 = FPGA Configuration Error
        Bit 3 = Synthesis Clock PLL Lock
        Bit 4 = External Reference PLL Lock
        Bit 5 = Composite PLL Lock
        Bit 6 = Symbol PLL Lock
        Bit 7 = Invalid Terrestrial Interface
        "
    ::= { radSNMPModStatus 4 }

radLatchedMinorAlarmStatus OBJECT-TYPE
    SYNTAX  INTEGER (0..255)
    ACCESS  read-only
    STATUS  current
    DESCRIPTION
        "Minor Alarm latched status:
        A bit field. 0 = PASS, 1 = FAIL
        Bit 0 = Terr Ethernet data activity detect
        Bit 1 = Terrestrial clock activity detect
        Bit 2 = Tx data activity detect
        Bit 3 = FIFO overflow/underflow error
        Bit 4 = Output Level
        Bit 5 = Loss of frame synchronization
        Bit 6 = Terr Ethernet jitter buffer underflow
        Bit 7 = Terr Ethernet jitter buffer overflow
        "
    ::= { radSNMPModStatus 5 }

radLatchedCommonAlarmStatus OBJECT-TYPE
    SYNTAX  INTEGER (0..255)
    ACCESS  read-only
```

```
        STATUS  current
        DESCRIPTION
            "Common Alarm latched status:
            A bit field. 0 = PASS, 1 = FAIL
            Bit 0 = -12V alarm.
            Bit 1 = +12V alarm.
            Bit 2 = +5V  alarm.
            "
        ::= { radSNMPModStatus 6 }

    radRevisionNumber OBJECT-TYPE
        SYNTAX  INTEGER (0..255)
        ACCESS  read-only
        STATUS  optional
        DESCRIPTION
            "M&C Revision number."
        ::= { radSNMPModStatus 7 }

    radPlus5Volts OBJECT-TYPE
        SYNTAX  RadVoltageLevel (0..255)
        ACCESS  read-only
        STATUS  current
        DESCRIPTION
            "+5V monitor with implied decimal point.
            For example, a value of 51 represents +5.1 Volts."
        ::= { radSNMPModStatus 8 }

    radPlus12Volts OBJECT-TYPE
        SYNTAX  RadVoltageLevel (0..255)
        ACCESS  read-only
        STATUS  current
        DESCRIPTION
            "+12V monitor with implied decimal point.
            For example, a value of 119 represents +11.9 Volts."
        ::= { radSNMPModStatus 9 }

    radMinus12Volts OBJECT-TYPE
        SYNTAX  RadVoltageLevel (-255..0)
        ACCESS  read-only
        STATUS  current
        DESCRIPTION
            "-12V monitor with implied decimal point.
            For example, a value of -122 represents -12.2 Volts."
        ::= { radSNMPModStatus 10 }

    radTemperature OBJECT-TYPE
        SYNTAX  INTEGER (0..1000)
        ACCESS  read-only
        STATUS  optional
        DESCRIPTION
            "Temperature monitor with implied decimal point.
            For example, a value of 490 represents 49.0 C"
        ::= { radSNMPModStatus 11 }

    radFactoryConfiguration OBJECT-TYPE
        SYNTAX  INTEGER (0..65535)
        ACCESS  read-only
        STATUS  optional
        DESCRIPTION
            "A bit field that shows the factory configuration
            options. 0=No, 1=Yes.
            Bit 0 = Serial Interface Present
            Bit 1 = Parallel Interface
            Bit 2 = ASI Norm Interface
            Bit 3 = ASI Null Interface
            Bit 4 = E3 Interface Present
            Bit 5 = T3 Interface Present
            Bit 6 = STS-1 Interface Present
            Bit 7 = HSSI Interface Present
            Bit 8 = DSS Option Enabled
            Bit 9 = SNMP Option Enabled
            Bit 10 = Parallel DVB Present
            Bit 11 = Parallel M2P Present
            Bit 12 = DVB LVDS Present
```

```
                Bit 13 = OC3 Interface Present
                Bit 14..15 = Spares
                unsupported"
            ::= { radSNMPModStatus 12 }

        radLastRateStatus   OBJECT-TYPE
            SYNTAX  INTEGER {
                symbol(0),
                data(1)
            }
            ACCESS  read-only
            STATUS  current
            DESCRIPTION
                "Shows the current rate precedence. See Last Rate Control
                notes."
            ::= { radSNMPModStatus 13 }

        radFirmwarePartRev OBJECT-TYPE
            SYNTAX  RadString (SIZE (16))
            ACCESS  read-only
            STATUS  current
            DESCRIPTION
                "Provides the system firmware part and revision number."
            ::= { radSNMPModStatus 14 }

        radActivePiicSlot OBJECT-TYPE
            SYNTAX  INTEGER
            ACCESS  read-only
            STATUS  current
            DESCRIPTION
                "Indicates the active PIIC slot."
            ::= { radSNMPModStatus 15 }

    --  radPiicSlotStatusTable OBJECT-TYPE
    --      SYNTAX   SEQUENCE OF RadPiicSlotStatusEntry
    --      ACCESS   not-accessible
    --      STATUS   mandatory
    --      DESCRIPTION
    --          "PIIC slot status table"
    --      ::= { radSNMPModStatus 16 }
    --
    --  radPiicSlotStatusEntry OBJECT-TYPE
    --      SYNTAX   RadPiicSlotStatusEntry
    --      ACCESS   not-accessible
    --      STATUS   optional
    --      DESCRIPTION
    --          "PIIC slot status table entry"
    --      INDEX    { radPiicSlotStatusIndex }
    --      ::= { radPiicSlotStatusTable 1 }
    --
    --  RadPiicSlotStatusEntry ::=
    --      SEQUENCE {
    --          radPiicSlotStatusIndex   INTEGER,
    --          radPiicSlotCardType      RadInterfaceCardType,
    --          radPiicSlotClockActivity INTEGER,
    --          radPiicSlotDataActivity  INTEGER
    --      }
    --
    --  radPiicSlotStatusIndex OBJECT-TYPE
    --      SYNTAX  INTEGER
    --      ACCESS  not-accessible
    --      STATUS  current
    --      DESCRIPTION
    --          "Index for radPiicSlotStatusTable."
    --      ::= { radPiicSlotStatusEntry 1 }
    --
    --  radPiicSlotCardType OBJECT-TYPE
    --      SYNTAX  RadInterfaceCardType
    --      ACCESS  read-only
    --      STATUS  current
    --      DESCRIPTION
    --          "Indicates the type of interface card in a slot."
    --      ::= { radPiicSlotStatusEntry 2 }
    --
```

```
-- radPiicSlotClockActivity OBJECT-TYPE
--     SYNTAX  INTEGER {
--         inactive( 0),
--         active( 1)
--     }
--     ACCESS  read-only
--     STATUS  current
--     DESCRIPTION
--         "Indicates clock activity of an interface card in a slot."
--     ::= { radPiicSlotStatusEntry 3 }
--
-- radPiicSlotDataActivity OBJECT-TYPE
--     SYNTAX  INTEGER {
--         inactive( 0),
--         active( 1)
--     }
--     ACCESS  read-only
--     STATUS  current
--     DESCRIPTION
--         "Indicates data activity of an interface card in a slot."
--     ::= { radPiicSlotStatusEntry 4 }

    radRfSwitchActiveSide OBJECT-TYPE
        SYNTAX  INTEGER {
            primary(1),
            backup(2)
        }
        ACCESS  read-only
        STATUS  current
        DESCRIPTION
            "Indicates the active input of the RF switch."
        ::= { radSNMPModStatus 17 }

    radRfSwitchDistantSideFault OBJECT-TYPE
        SYNTAX  INTEGER {
            normal(1),
            faulted(2)
        }
        ACCESS  read-only
        STATUS  current
        DESCRIPTION
            "Indicates the fault status of the modulator
            at the distant side of the RF switch."
        ::= { radSNMPModStatus 18 }

    radRfSwitchConnectorSide OBJECT-TYPE
        SYNTAX  INTEGER {
            primary(1),
            backup(2)
        }
        ACCESS  read-only
        STATUS  current
        DESCRIPTION
            "Indicates the side of the RF switch to which the
            modulator is connected."
        ::= { radSNMPModStatus 19 }

    radTerrEthPortStatus   OBJECT-TYPE
        SYNTAX  INTEGER {
            down(0),
            unresolved(1),
            half10m(2),
            half100m(3),
            full10m(4),
            full100m(5),
            half1gig(6),
            full1gig(7)
        }
        ACCESS  read-only
        STATUS  current
        DESCRIPTION
            "Shows the link status of the active Gig Ethernet card."
        ::= { radSNMPModStatus 20 }
```

```
radTerrEthActPrime   OBJECT-TYPE
   SYNTAX  INTEGER {
      disabled(0),
      noActivity(1),
      onlineActivity(2),
      offlineActivity(3)
   }
   ACCESS  read-only
   STATUS  current
   DESCRIPTION
      "Shows the data activity of the Gig Ethernet card."
   ::= { radSNMPModStatus 21 }

radTerrEthActPrimeCol   OBJECT-TYPE
   SYNTAX  INTEGER {
      disabled(0),
      noActivity(1),
      onlineActivity(2),
      offlineActivity(3)
   }
   ACCESS  read-only
   STATUS  current
   DESCRIPTION
      "Shows the data activity of the Gig Ethernet card."
   ::= { radSNMPModStatus 22 }

radTerrEthActPrimeRow   OBJECT-TYPE
   SYNTAX  INTEGER {
      disabled(0),
      noActivity(1),
      onlineActivity(2),
      offlineActivity(3)
   }
   ACCESS  read-only
   STATUS  current
   DESCRIPTION
      "Shows the data activity of the Gig Ethernet card."
   ::= { radSNMPModStatus 23 }

radTerrEthActBackup   OBJECT-TYPE
   SYNTAX  INTEGER {
      disabled(0),
      noActivity(1),
      onlineActivity(2),
      offlineActivity(3)
   }
   ACCESS  read-only
   STATUS  current
   DESCRIPTION
      "Shows the backup data activity of the Gig Ethernet card."
   ::= { radSNMPModStatus 24 }

radTerrEthActBackupCol   OBJECT-TYPE
   SYNTAX  INTEGER {
      disabled(0),
      noActivity(1),
      onlineActivity(2),
      offlineActivity(3)
   }
   ACCESS  read-only
   STATUS  current
   DESCRIPTION
      "Shows the backup data activity of the Gig Ethernet card."
   ::= { radSNMPModStatus 25 }

radTerrEthActBackupRow   OBJECT-TYPE
   SYNTAX  INTEGER {
      disabled(0),
      noActivity(1),
      onlineActivity(2),
      offlineActivity(3)
   }
   ACCESS  read-only
   STATUS  current
```

```
        DESCRIPTION
          "Shows the backup data activity of the Gig Ethernet card."
        ::= { radSNMPModStatus 26 }

      radTerrEthJitterFill OBJECT-TYPE
        SYNTAX  INTEGER (0..99)
        ACCESS  read-only
        STATUS  current
        DESCRIPTION
          "Percent fill of jitter buffer for the Gig Ethernet card."
        ::= { radSNMPModStatus 27 }

              radTerrEthNullPkts OBJECT-TYPE
        SYNTAX  Counter32
        ACCESS  read-only
        STATUS  current
        DESCRIPTION
          "Null packet count for the Gig Ethernet card."
        ::= { radSNMPModStatus 28 }

              radTerrEthCorrPkts OBJECT-TYPE
        SYNTAX  Counter32
        ACCESS  read-only
        STATUS  current
        DESCRIPTION
          "Corrected packet count for the Gig Ethernet card."
        ::= { radSNMPModStatus 29 }

              radTerrEthReorPkts OBJECT-TYPE
        SYNTAX  Counter32
        ACCESS  read-only
        STATUS  current
        DESCRIPTION
          "Reordered packet count for the Gig Ethernet card."
        ::= { radSNMPModStatus 30 }

      radTerrEthClrStats OBJECT-TYPE
        SYNTAX  INTEGER {
          toggle0(0),
          toggle1(1)
        }
        ACCESS  read-write
        STATUS  current
        DESCRIPTION
          "Clears the Gig Ethernet card statistics."
        ::= { radSNMPModStatus 31 }

      radSystemModelName OBJECT-TYPE
        SYNTAX  RadString (SIZE (16))
        ACCESS  read-only
        STATUS  optional
        DESCRIPTION
          "Provides a Model indicator string.
          DM240,DM240 AMC or DM240XR"
        ::= { radSNMPModStatus 32 }

    END
```

# Chapter 9. Remote Operations

***When new features are added to Radyne Corp. equipment, the control parameters are appended to the end of the Non-Volatile Section of the Remote Communications Specification, and status of the features, if any, are added at the end of the Volatile Section. If a remote M&C queries two pieces of Radyne Corp. equipment with different revision software, they could respond with two different sized packets. The remote M&C MUST make use of the non-volatile count value to index to the start of the Volatile Section. If the remote M&C is not aware of the newly added features to the product, it should disregard the parameters at the end of the Non-Volatile Section and index to the start of the Volatile Section.***

***Before creating any software based on the information contained in this document, contact the Radyne Corp. Customer Service Department (602-437-9620) to find out if the software revision for that piece of equipment is current and that no new features have been added since the release of this document.***

## 9.1 DM240XR Opcode Command Set

The DM240XR Opcode Command Set is listed below.

## 9.2 Modulator Command Set

| Command | Opcode |
|---|---|
| Query Mod All | **2400h** |
| Query Mod Latched Alarms | 2405h |
| Query Mod Current Alarms | 2408h |
| Query Mod Status | 240Bh |
| Query Time | 240Eh |
| Query Date | 240Fh |
| Query Time and Date | 2410h |
| Query Firmware Part/Rev | 2414h |
| Query AASI NULL PID (w/IPSat interface card only) | 2456h |
| Query IPSat Burst Demod Count (w/IPSat interface card only) | 2457h |
| Query IPSat Control PID (w/IPSat interface card only) | 2458h |
| Query IPSat Enable (w/IPSat interface card only) | 2459h |
| Query IPSat User Data Rate (w/IPSat interface card only) | 245Ah |
| Query PCR Restamping | 245Bh |
| Query Multi-PIIC Configuration (w/Multi-PIIC interface card only) | 245Ch |
| Query Multi-PIIC Status (w/Multi-PIIC interface card only) | 245Dh |
| Query Terrestrial COP3 Ethernet Configuration | 2552h |
| Query Terrestrial COP3 Ethernet Port Status | 2553h |
| Query Pilot Symbols | 2554h |
| Query RF Switch Status (w/RF Switch hardware only) | 2560h |
| Command Mod Configuration | 2601h |
| Command Mod Single Parameter: | |
| Frequency | 2602h |
| Data Rate | 2604h |
| Modulation Type | 2606h |
| Inner FEC Rate | 2607h |
| Tx On/Off | 2609h |
| Carrier Type | 260Ah |
| Input Clock Source | 260Bh |
| Input Clock Polarity | 260Ch |
| Transmit Power Level | 260Fh |
| Spectrum | 2611h |
| Reference Source | 2616h |
| Network Specification | 2619h |
| External Reference Frequency | 261Bh |
| Data Polarity | 2620h |

| | |
|---|---|
| Terrestrial Interface Type | 2621h |
| Terrestrial Framing | 2640h |
| Carrier Set Roll Off | 2641h |
| Output Clock Source | 2642h |
| Symbol Rate | 2643h |
| AASI NULL PID (w/IPSat interface card only) | 2656h |
| IPSat Burst Demod Count (w/IPSat interface card only) | 2657h |
| IPSat Control PID (w/IPSat interface card only) | 2658h |
| IPSat Enable (w/IPSat interface card only) | 2659h |
| Command PCR Restamping | 265Bh |
| Command Multi-PIIC Configuration (w/Multi-PIIC Interface Card only) | 265Ch |
| Command Terrestrial COP3 Ethernet Configuration | 2B52h |
| Clear Terrestrial COP3 Ethernet Configuration | 2B53h |
| Command Pilot Symbols | 2B54h |
| Command Clear Latched Alarms | 2C03h |
| Command Set Time | 2C04h |
| Command Set Date | 2C05h |
| Command Set Time and Date | 2C06h |
| Command RF Switch Redundancy Mode (w/RF Switch hardware only) | 2F40h |
| Command RF Switch Fault Test (w/RF Switch hardware only) | 2F41h |
| Command RF Switch Activate Side (w/RF Switch hardware only) | 2F42h |

## 9.3 Detailed Command Descriptions

**Opcode: <2400h>** (Query Mod All) Query a Modulator's Configuration and Status

| **Query Response** | | |
|---|---|---|
| <1> | Number of Nonvol bytes | |
| **Configuration Bytes** | | |
| <4> | IF Frequency | Binary Value, units Hz in 1Hz steps.<br>50000000Hz to 180000000Hz 70/140<br>950000000Hz to 2050000000Hz L-Band |
| <2> | Reserved | TBD |
| <4> | Data Rate | Binary Value, 1bps steps |
| <4> | External Reference | Binary Value, units Hz in 8000Hz steps, e.g. 1000000Hz, 1008000Hz, etc.<br>256000Hz to 10000000Hz |

| | | |
|---|---|---|
| <1> | Frequency Reference Source | 0 = Internal, 1 = External |
| <1> | Modulation Type | 0 = QPSK, 1 = BPSK, 2 = 8PSK, 3 = 16QAM<br>9 = 16APSK, 10 = 32APSK |
| <1> | Inner FEC Rate | 1 = 1/2 Rate, 2 = 2/3 Rate, 3 = 3/4 Rate, 4 = 5/6 Rate, 5 = 7/8 Rate, 6 = 6/7 Rate, 7=4/5, 8 = 8/9 Rate, 9 = 9/10 Rate, 128 = 1/4 Rate, 129 = 1/3 Rate, 130 = 2/5 Rate, 131 = 3/5 Rate |
| <1> | Reserved | TBD, Default = 1 |
| <1> | Reserved | TBD, Default = 1 |
| <1> | Reserved | TBD, Default = 0 |
| <1> | Reserved | TBD, Default = 0 |
| <2> | Transmit Power Level | d Value. 0 to –250 (0.0 to –25.0 dBm) |
| <1> | Carrier Control | 0 = Off, 1 = On |
| <1> | Carrier Test | 0 = Normal, 1 = CW, 2 = Dual, 3 = Offset, 4 = Pos FIR, 5 = Neg FIR |
| <1> | Spectrum | 0 = Inverted, 1 = Normal |
| <1> | Reserved | TBD, 0 = Default |

| | | |
|---|---|---|
| <1> | Tx Interface Type | 0 = Serial,<br>1 = Parallel,<br>2 = ASI,<br>3 = Advance ASI,<br>4 = G.703E3,<br>5 = G.703T3,<br>6 = G.703STS-1,<br>7 = HSSI,<br>8 = Parallel DVB,<br>9 = Parallel M2P,<br>10 = None,<br>13 = OC3,<br>14 = STM-1,<br>15 = G.703E2,<br>16 = G.703T2Bal,<br>17 = G.703T2Unbal,<br>18 = G.703E1Bal,<br>19 = G.703E1Unbal,<br>20 = G.703T1AMI<br>21 = G.703T1B8ZS<br>22 = ETHERNET |
| <1> | Input Clock Polarity | 0 = Normal, 1 = Inverted |
| <1> | Data Polarity | 0 = Normal, 1 = Inverted |
| <1> | Input Clock | 0 = SCTE, 1 = SCT |

| | | |
|---|---|---|
| | Source | |
| <1> | Reserved | TBD, Default = 0 |
| <11> | Reserved | TBD |
| <1> | Reserved | TBD |
| <1> | Major Alarm Mask | Bit 0 = Spare<br>Bit 1 = Transmit Oversample PLL Lock<br>Bit 2 = FPGA Config Error<br>Bit 3 = IF Synthesizer PLL Lock<br>Bit 4 = External Reference PLL Lock<br>Bit 5 = Composite (SCT) PLL Lock<br>Bit 6 = Symbol PLL Lock<br>Bit 7 = Spare<br>0 = Mask, 1 = Allow |
| <1> | Minor Alarm Mask | Bit 0 = Terrestrial Ethernet data activity detect<br>Bit 1 = Loss Terrestrial Clock<br>Bit 2 = Loss Terrestrial Data<br>Bit 3 = FIFO Error<br>Bit 4 = Output Level<br>Bit 5 = Terrestrial Framing Error<br>Bit 6 = Terr Ethernet jitter buffer underflow<br>Bit 7 = Terr Ethernet jitter buffer overflow<br>0 = Mask, 1 = Allow |
| <1> | Common Fault Mask | Bit 0 = -12 V Alarm<br>Bit 1 = +12 V Alarm<br>Bit 2 = +5 V Alarm<br>Bit 3 = Spare<br>Bit 4 = Spare<br>Bit 5 = Spare<br>Bit 6 = Spare<br>Bit 7 = Spare<br>0 = Mask, 1 = Allow |
| <1> | Reserved | TBD, Default = 0 |
| <4> | Symbol Rate | Symbol Rate in Symbols Per Second |
| <1> | Terrestrial Framing | 0 = 188 Byte, 1 = 204 Byte, 2 = No Framing<br>5 = COP3, 6 = ACM, 7 = Bridge |
| <1> | Roll Off | 0 = 0.35, 25 = 0.25, 1 = 0.20 |
| <1> | Reserved | TBD |
| <1> | Output Clock Source | CTE, 1 = SCT, 2 = None |
| <1> | Network Spec | 0 = DVB-S<br>9 = DirecTV<br>11 = DVB-S2 CCM<br>13 = Only DirecTV<br>15 = DVB-S2 ACM |

| | | |
|---|---|---|
| <1> | BB Scrambler Bypass | 0 = Normal, 1 = Bypass |
| <1> | Outer FEC Bypass | 0 = Normal, 1 = Bypass |
| <1> | Test Pattern | 0 = None, 1 = $2^{15} - 1$, 23 = $2^{23}$-1 |
| <1> | Last Rate Control | 0 = Symbol Rate, 1 = Data Rate, 2 = Auto |
| <1> | Interleaver Bypass | 0 = Bypass, 1 = Normal |
| <1> | PCR Restamping | 0 = Off, 1= On |
| <1> | Multi-PIIC Mode | 1 = Manual,<br>2 = Redundancy |
| <1> | Redundancy Mode | 0 = Force Prime,<br>1 = Force Backup,<br>2 = Manual Revert,<br>3 = Auto-Revert |
| <1> | Prime PIIC Slot | 1 – 3 |
| <1> | Backup PIIC Slot | 1 – 3 |
| <1> | Pilot Symbols | 0 = Off, 1= On |
| <1> | Inner FEC Bypass | 0 = Normal, 1 = Bypass |
| <1> | PL Scrambler Bypass | 0 = Normal, 1 = Bypass |
| <1> | Reserved | Set to 0 |
| <1> | Reserved | Set to 1 |
| <2> | Reserved | Set to 0 |
| <4> | Gold Code Seq Index | 0 to 262142 |
| <1> | Sat Framing | 3=DVB-S, 5=DTV, 10=DVB-S2 Normal, 15=DVB-S2 Short |
| <1> | Auto EQ Enable | 0=Off, 1=On |
| <9> | Auto EQ Filter Coef Name | 8-character NULL terminated string, this is the filter's name as shown on the front panel (identical to the filter's base filename, the extension is assumed to be "AEQ") |
| | **Status Bytes** | |
| <1> | Reserved | |
| <1> | Reserved | |

| | | |
|---|---|---|
| <1> | Reserved | |
| <1> | Major Alarm | Bit 0 = Spare<br>Bit 1 = Transmit Oversample PLL Lock<br>Bit 2 = FPGA Config Error<br>Bit 3 = IF Synthesizer PLL Lock<br>Bit 4 = External Reference PLL Lock<br>Bit 5 = Composite PLL Lock<br>Bit 6 = Symbol PLL Lock<br>Bit 7 = Spare<br>0 = Pass, 1 = Fail |
| <1> | Minor Alarm | Bit 0 = Terrestrial Ethernet data activity detect<br>Bit 1 = Loss Terrestrial Clock<br>Bit 2 = Loss Terrestrial Data<br>Bit 3 = FIFO Error<br>Bit 4 = Output Level<br>Bit 5 = Terrestrial Framing Error<br>Bit 6 = Terr Ethernet jitter buffer underflow<br>Bit 7 = Terr Ethernet jitter buffer overflow<br>0 = Pass, 1 = Fail |
| <1> | Common Fault | Bit 0 = -12 V Alarm<br>Bit 1 = +12 V Alarm<br>Bit 2 = +5 V Alarm<br>Bit 3 = Spare<br>Bit 4 = Spare<br>Bit 5 = Spare<br>Bit 6 = Spare<br>Bit 7 = Spare<br>0 = Pass, 1 = Fail |
| <1> | Latched Major Alarm | Bit 0 = Spare<br>Bit 1 = Transmit Oversample PLL Lock<br>Bit 2 = FPGA Config Error<br>Bit 3 = IF Synthesizer PLL Lock<br>Bit 4 = External Reference PLL Lock<br>Bit 5 = Composite PLL Lock<br>Bit 6 = Symbol PLL Lock<br>Bit 7 = Spare<br>0 = Pass, 1 = Fail |
| <1> | Latched Minor Alarm | Bit 0 = Terrestrial Ethernet data activity detect<br>Bit 1 = Loss Terrestrial Clock<br>Bit 2 = Loss Terrestrial Data<br>Bit 3 = FIFO Error<br>Bit 4 = Output Level<br>Bit 5 = Terrestrial Framing Error<br>Bit 6 = Terr Ethernet jitter buffer underflow<br>Bit 7 = Terr Ethernet jitter buffer overflow<br>0 = Pass, 1 = Fail |
| <1> | Latched Common Fault | Bit 0 = -12 V Alarm<br>Bit 1 = +12 V Alarm<br>Bit 2 = +5 V Alarm |

| | | |
|---|---|---|
| | | Bit 3 = Spare<br>Bit 4 = Spare<br>Bit 5 = Spare<br>Bit 6 = Spare<br>Bit 7 = Spare<br>0 = Pass, 1 = Fail |
| <1> | Reserved | |
| <1> | +5 Voltage | Implied Decimal Point. 49 = +4.9 V |
| <1> | +12 Voltage | Implied Decimal Point. 121 = +12.1 V |
| <1> | -12 Voltage | -12 V. Implied Decimal Point and Minus Sign. 118 = -11.8 V |
| <2> | Reserved | TBD |
| <2> | Reserved | TBD |
| <1> | Last Rate Status | 0 = Symbol Rate, 1 = Data Rate |
| <1> | Active PIIC Slot | 1 – 3 |
| <1> | Slot 1 PIIC Type | 0x13 = ASI |
| <1> | Slot 2 PIIC Type | 0x00 = INVALID<br>0x93 = ASI<br>0x94 = RS422 Parallel<br>0x95 = LVDS Parallel<br>0x96 = HSSI<br>0x9C = DirecTV (PECL)<br>0x9D = Ethernet<br>0xD3 = ASI Out (Monitor)<br>0xA1 = Auto EQ<br>0xE2 = RS422/530 Serial<br>0xFF = None |
| <1> | Slot 3 PIIC Type | 0x00 = INVALID<br>0x93 = ASI<br>0x94 = RS422 Parallel<br>0x95 = LVDS Parallel<br>0x96 = HSSI<br>0x9C = DirecTV (PECL)<br>0x9D = Ethernet<br>0xD3 = ASI Out ( Monitor)<br>0xA1 = Auto EQ<br>0xE2 = RS422/530 Serial<br>0xFF = None |
| <1> | PIIC Clock Activity | Bit 1 = Slot 1 Activity<br>Bit 2 = Slot 2 Activity<br>Bit 3 = Slot 3 Activity |
| <1> | PIIC Data Activity | Bit 1 = Slot 1 Activity<br>Bit 2 = Slot 2 Activity<br>Bit 3 = Slot 3 Activity |

**Opcode: <2405h>** Query a Modulator's Latched Alarms

| Query response | | |
|---|---|---|
| <1> | Latched Major Alarm | Bit 0 = Spare<br>Bit 1 = Transmit Oversample PLL Lock<br>Bit 2 = FPGA Config Error<br>Bit 3 = IF Synthesizer PLL Lock<br>Bit 4 = External Reference PLL Lock<br>Bit 5 = Composite PLL Lock<br>Bit 6 = Symbol PLL Lock<br>Bit 7 = Spare<br>0 = Pass, 1 = Fail |
| <1> | Latched Minor Alarm | Bit 0 = Terrestrial Ethernet data activity detect<br>Bit 1 = Loss Terrestrial Clock<br>Bit 2 = Loss Terrestrial Data<br>Bit 3 = FIFO Error<br>Bit 4 = Output Level<br>Bit 5 = Terrestrial Framing Error<br>Bit 6 = Terr Ethernet jitter buffer underflow<br>Bit 7 = Terr Ethernet jitter buffer overflow<br>0 = Pass, 1 = Fail |
| <1> | Latched Common Fault | Bit 0 = -12 V Alarm<br>Bit 1 = +12 V Alarm<br>Bit 2 = +5 V Alarm<br>Bit 3 = Spare<br>Bit 4 = Spare<br>Bit 5 = Spare<br>Bit 6 = Spare<br>Bit 7 = Spare<br>0 = Pass, 1 = Fail |

**Opcode: <2408h>** Query a Modulator's Current Alarms

| Query response | | |
|---|---|---|
| <1> | Major Alarm | Bit 0 = Spare<br>Bit 1 = Transmit Oversample PLL Lock<br>Bit 2 = FPGA Config Error<br>Bit 3 = IF Synthesizer PLL Lock<br>Bit 4 = External Reference PLL Lock<br>Bit 5 = Composite PLL Lock<br>Bit 6 = Symbol PLL Lock<br>Bit 7 = Spare<br>0 = Pass, 1 = Fail |
| <1> | Minor Alarm | Bit 0 = Terrestrial Ethernet data activity detect<br>Bit 1 = Loss Terrestrial Clock<br>Bit 2 = Loss Terrestrial Data<br>Bit 3 = FIFO Error<br>Bit 4 = Output Level<br>Bit 5 = Terrestrial Framing Error<br>Bit 6 = Terr Ethernet jitter buffer underflow<br>Bit 7 = Terr Ethernet jitter buffer overflow |

| | | |
|---|---|---|
| | | 0 = Pass, 1 = Fail |
| <1> | Common Fault | Bit 0 = -12 V Alarm<br>Bit 1 = +12 V Alarm<br>Bit 2 = +5 V Alarm<br>Bit 3 = Spare<br>Bit 4 = Spare<br>Bit 5 = Spare<br>Bit 6 = Spare<br>Bit 7 = Spare<br>0 = Pass, 1 = Fail |

**Opcode: <240Bh>** Query a Modulator's Status

| **Query Response** | | |
|---|---|---|
| <1> | Reserved | |
| <1> | Reserved | |
| <1> | Reserved | |
| <1> | Major Alarm | Bit 0 = Spare<br>Bit 1 = Transmit Oversample PLL Lock<br>Bit 2 = FPGA Config Error<br>Bit 3 = IF Synthesizer PLL Lock<br>Bit 4 = External Reference PLL Lock<br>Bit 5 = Composite PLL Lock<br>Bit 6 = Symbol PLL Lock<br>Bit 7 = Spare<br>0 = Pass, 1 = Fail |
| <1> | Minor Alarm | Bit 0 = Terrestrial Ethernet data activity detect<br>Bit 1 = Loss Terrestrial Clock<br>Bit 2 = Loss Terrestrial Data<br>Bit 3 = FIFO Error<br>Bit 4 = Output Level<br>Bit 5 = Terrestrial Framing Error<br>Bit 6 = Terr Ethernet jitter buffer underflow<br>Bit 7 = Terr Ethernet jitter buffer overflow<br>0 = Pass, 1 = Fail |
| <1> | Common Fault | Bit 0 = -12 V Alarm<br>Bit 1 = +12 V Alarm<br>Bit 2 = +5 V Alarm<br>Bit 3 = Spare<br>Bit 4 = Spare<br>Bit 5 = Spare<br>Bit 6 = Spare<br>Bit 7 = Spare<br>0 = Pass, 1 = Fail |

| | | |
|---|---|---|
| <1> | Latched Major Alarm | Bit 0 = Spare<br>Bit 1 = Transmit Oversample PLL Lock<br>Bit 2 = FPGA Config Error<br>Bit 3 = IF Synthesizer PLL Lock<br>Bit 4 = External Reference PLL Lock<br>Bit 5 = Composite PLL Lock<br>Bit 6 = Symbol PLL Lock<br>Bit 7 = Spare<br>0 = Pass, 1 = Fail |
| <1> | Latched Minor Alarm | Bit 0 = Terrestrial Ethernet data activity detect<br>Bit 1 = Loss Terrestrial Clock<br>Bit 2 = Loss Terrestrial Data<br>Bit 3 = FIFO Error<br>Bit 4 = Output Level<br>Bit 5 = Terrestrial Framing Error<br>Bit 6 = Terr Ethernet jitter buffer underflow<br>Bit 7 = Terr Ethernet jitter buffer overflow<br>0 = Pass, 1 = Fail |
| <1> | Latched Common Fault | Bit 0 = -12 V Alarm<br>Bit 1 = +12 V Alarm<br>Bit 2 = +5 V Alarm<br>Bit 3 = Spare<br>Bit 4 = Spare<br>Bit 5 = Spare<br>Bit 6 = Spare<br>Bit 7 = Spare<br>0 = Pass, 1 = Fail |
| <1> | Reserved | TBD |
| <1> | +5 Voltage | +5 V. Implied Decimal Point. Ex: 49 = +4.9 V |
| <1> | +12 Voltage | +12 V. Implied Decimal Point. Ex: 121 = +12.1 V |
| <1> | -12 Voltage | -12 V. Implied Decimal Point and Minus Sign.<br>Ex: 118 = -11.8 V |
| <2> | Reserved | TBD |
| <2> | Reserved | TBD |
| <1> | Last Rate Status | 0 = Symbol Rate, 1 = Data Rate |
| <1> | Active PIIC Slot | 1 – 3 |

| | | |
|---|---|---|
| <1> | Slot 1 PIIC Type | 0x13 = ASI |
| <1> | Slot 2 PIIC Type | 0x00 = INVALID<br>0x93 = ASI<br>0x94 = RS422 Parallel<br>0x95 = LVDS Parallel<br>0x96 = HSSI<br>0x9C = DirecTV (PECL)<br>0x9D = Ethernet<br>0xD3 = ASI Out (Monitor)<br>0xA1 = Auto EQ<br>0xE2 = RS422/530 Serial<br>0xFF = None |
| <1> | Slot 3 PIIC Type | 0x00 = INVALID<br>0x93 = ASI<br>0x94 = RS422 Parallel<br>0x95 = LVDS Parallel<br>0x96 = HSSI<br>0x9C = DirecTV (PECL)<br>0x9D = Ethernet<br>0xD3 = ASI Out (Monitor)<br>0xA1 = Auto EQ<br>0xE2 = RS422/530 Serial<br>0xFF = None |
| <1> | PIIC Clock Activity | Bit 1 = Slot 1 Activity<br>Bit 2 = Slot 2 Activity<br>Bit 3 = Slot 3 Activity |
| <1> | PIIC Data Activity | Bit 1 = Slot 1 Activity<br>Bit 2 = Slot 2 Activity<br>Bit 3 = Slot 3 Activity |

**Opcode: <240Eh>** Query Time

| | | |
|---|---|---|
| <1> | Hour | 0 – 23 |
| <1> | Minute | 0 – 59 |
| <1> | Second | 0 – 59 |

**Opcode: <240Fh>** Query Date

| | | |
|---|---|---|
| <1> | Year | 0 – 99 |
| <1> | Month | 1 – 12 |
| <1> | Day | 1 – 31 |

**Opcode: <2410h>** Query Time and Date

| | | |
|---|---|---|
| <1> | Year | 0 – 99 |
| <1> | Month | 1 – 12 |
| <1> | Day | 1 – 31 |
| <1> | Hour | 0 – 23 |

| | | |
|---|---|---|
| <1> | Minute | 0 – 59 |
| <1> | Second | 0 – 59 |

**Opcode: <2414h>** Query Firmware Part/Rev

| | | |
|---|---|---|
| <16> | Firmware Part/Rev | ASCII null terminated string |

**Opcode: <2456h>** Query AASI NULL PID

| | | |
|---|---|---|
| <2> | PID | 0x0010 - 0x1FFF |

**Opcode: <2457h>** Query IPSat Burst Demod Count

| | | |
|---|---|---|
| <2> | Num Burst Demods | 1 – 50 |

**Opcode: <2458h>** Query IPSat Control PID

| | | |
|---|---|---|
| <2> | PID | 0x0010 - 0x1FFF |

**Opcode: <2459h>** Query IPSat Enable

| | | |
|---|---|---|
| <1> | IPSat Enable | 0 = OFF, 1 = ON |

**Opcode: <245Ah>** Query IPSat User Data Rate

| | | |
|---|---|---|
| <4> | Data Rate | bps. This represents the terrestrial data rate less the IPSat overhead. |

**Opcode: <245Bh>** Query PCR Restamping

| | | |
|---|---|---|
| <1> | PCR Restamping | 0 = Off, 1= On |

**Opcode: <245Ch>** Query Multi-PIIC Configuration

| | | |
|---|---|---|
| <1> | Multi-PIIC Mode | 1 = Manual,<br>2 = Redundancy |
| <1> | Redundancy Mode | 0 = Force Prime,<br>1 = Force Backup,<br>2 = Manual Revert,<br>3 = Auto-Revert |
| <1> | Prime PIIC Slot | 1 – 3 |
| <1> | Backup PIIC Slot | 1 – 3 |

**Opcode: <245Dh>** Query Multi-PIIC Status

| | | |
|---|---|---|
| <1> | Active PIIC Slot | 1 – 3 |
| <1> | Slot 1 PIIC Type | 0x13 = ASI |
| <1> | Slot 2 PIIC Type | 0x00 = INVALID<br>0x93 = ASI<br>0x94 = RS422 Parallel<br>0x95 = LVDS Parallel<br>0x96 = HSSI<br>0x9C = DirecTV (PECL)<br>0x9D = Ethernet<br>0xD3 = ASI Out (Monitor)<br>0xA1 = Auto EQ<br>0xE2 = RS422/530 Serial<br>0xFF = None |
| <1> | Slot 3 PIIC Type | 0x00 = INVALID<br>0x93 = ASI<br>0x94 = RS422 Parallel<br>0x95 = LVDS Parallel<br>0x96 = HSSI<br>0x9C = DirecTV (PECL)<br>0x9D = Ethernet<br>0xD3 = ASI Out (Monitor)<br>0xA1 = Auto EQ<br>0xE2 = RS422/530 Serial<br>0xFF = None |
| <1> | PIIC Clock Activity | Bit 1 = Slot 1 Activity<br>Bit 2 = Slot 2 Activity<br>Bit 3 = Slot 3 Activity |
| <1> | PIIC Data Activity | Bit 1 = Slot 1 Activity<br>Bit 2 = Slot 2 Activity<br>Bit 3 = Slot 3 Activity |

**Opcode: <2552>** Query Terrestrial COP3 Ethernet Configuration

| | | |
|---|---|---|
| <8> | Mac Address | Binary Value |
| <1> | Ethernet Mode | 0=UDP 1=COP3 2=COP3 FEC |
| <1> | Online Select | 0=Prime 1=Backup |

| | | |
|---|---|---|
| <2> | Jitter Size | 1 - 20 ( x 10ms steps ) |
| <1> | Jitter Tracking | 0=Widest 1=Wide 2=Mid Level 3=Narrow 4=Narrowest |
| <1> | Backup Revert | 0=Manual 1=Auto |
| <2> | Backup Delay | 1 - 50 ( x 100ms steps ) |
| <4> | Prime IP Address | Binary Value |
| <4> | Prime Source IP Address | Binary Value |
| <2> | Prime UDP Port | Binary Value |
| <4> | Unicast IP Address | Binary Value |
| <4> | Backup IP Address | Binary Value |
| <4> | Backup Source IP Address | Binary Value |
| <2> | Backup UDP Port | Binary Value |

**Opcode: <2553>** Query Terrestrial COP3 Ethernet Port Status

| | | |
|---|---|---|
| <1> | Port Status | 0=Down 1=Unresolved 2=10Meg Half 3=100Meg Full 4=10Meg Full 5=100Meg Full 7=1000Meg Full |
| <1> | Prime Activity | 0=Disabled 1=None 2=Online 3=Offline |
| <1> | Prime Col Activity | 0=Disabled 1=None 2=Online 3=Offline |
| <1> | Prime Row Activity | 0=Disabled 1=None 2=Online 3=Offline |
| <1> | Backup Activity | 0=Disabled 1=None 2=Online 3=Offline |
| <1> | Backup Col Activity | 0=Disabled 1=None 2=Online 3=Offline |
| <1> | Backup Row Activity | 0=Disabled 1=None 2=Online 3=Offline |
| <1> | Jitter Buffer Fill | 0-99 (Percentage Filled) |
| <4> | Null Packets | Binary Value |
| <4> | Corrected Packets | Binary Value |
| <4> | Reordered Packets | Binary Value |

**Opcode: <2B52>** Command Terrestrial COP3 Ethernet Configuration

| | | |
|---|---|---|
| <8> | Mac Address | Binary Value |
| <1> | Ethernet Mode | 0=UDP 1=COP3 2=COP3 FEC |
| <1> | Online Select | 0=Prime 1=Backup |
| <2> | Jitter Size | 1 - 20 ( x 10ms steps ) |
| <1> | Jitter Tracking | 0=Widest 1=Wide 2=Mid Level 3=Narrow 4=Narrowest |
| <1> | Backup Revert | 0=Manual 1=Auto |
| <2> | Backup Delay | 1 - 50 ( x 100ms steps ) |
| <4> | Prime IP Address | Binary Value |
| <4> | Prime Source IP Address | Binary Value |
| <2> | Prime UDP Port | Binary Value |
| <4> | Unicast IP Address | Binary Value |
| <4> | Backup IP Address | Binary Value |
| <4> | Backup Source IP Address | Binary Value |
| <2> | Backup UDP Port | Binary Value |

**Opcode: <2B53>** Clear Terrestrial COP3 Ethernet Reset Statistics

| | | |
|---|---|---|
| <1> | Clear Ethernet Stats | 0 |

**Opcode: <2554h>** Query Pilot Symbols

| | | |
|---|---|---|
| <1> | Pilot Symbols | 0=Off, 1=On |

**Opcode: <2B54h>** Command Pilot Symbols

| | | |
|---|---|---|
| <1> | Pilot Symbols | 0=Off, 1=On |

**Opcode: <2560h>** Query RF Switch Status

| | | |
|---|---|---|
| <1> | Redundancy Mode | 3 = auto-revert, 4 = manual, 5 = backup |
| <1> | Fault Test | 0 = normal, 1 = faulted |
| <1> | Switch Connector | 0 = backup, 1 = prime |
| <1> | Online Side | 0 = backup, 1 = prime |
| <1> | Distant Status | 0 = normal, 1 = faulted |

**Opcode: <2601h>** Command a Modulator's Configuration

| | | |
|---|---|---|
| <4> | IF Frequency | Binary Value, units Hz in 1Hz steps.<br>50000000Hz to 180000000Hz 70/140<br>950000000Hz to 2050000000Hz L-Band |
| <2> | Reserved | TBD |
| <4> | Data Rate | Binary Value, 1 bps Steps **(See note at the end of this command.)** |
| <4> | External Reference | Binary Value, units Hz in 8000Hz steps, e.g. 1000000Hz, 1008000Hz, etc.<br>256000Hz to 10000000Hz |
| <1> | Frequency Reference Source | 0 = Internal, 1 = External |
| <1> | Modulation Type | 0 = QPSK, 1 = BPSK, 2 = 8PSK, 3 = 16QAM, 9 = 16APSK, 10 = 32APSK **(See note at the end of this command.)** |
| <1> | Inner FEC Rate | 1 = 1/2 Rate, 2 = 2/3 Rate, 3 = 3/4 Rate, 4 = 5/6 Rate, 5 = 7/8 Rate, 6 = 6/7 Rate, 7=4/5, 8 = 8/9 Rate, 9 = 9/10 Rate, 128 = 1/4 Rate, 129 = 1/3 Rate, 130 = 2/5 Rate, 131 = 3/5 Rate **(See note at the end of this command.)** |
| <1> | Reserved | TBD, Default = 1 |
| <1> | Reserved | TBD, Default = 1 |
| <1> | Reserved | TBD, Default = 0 |
| <1> | Reserved | TBD, Default = 0 |
| <2> | Transmit Power Level | Signed Value. 0 to –250 (0.0 to –25.0 dBm) |
| <1> | Carrier Control | 0 = Off, 1 = On |
| <1> | Carrier Type | 0 = Normal, 1 = CW, 2 = Dual, 3 = Offset, 4 = Pos FIR, 5 = Neg FIR |

| | | |
|---|---|---|
| <1> | Spectrum | 0 = Inverted, 1 = Normal |
| <1> | Reserved | TBD, 0 = Default |
| <1> | Tx Interface Type | 0 = Serial,<br>1 = Parallel,<br>2 = ASI,<br>3 = Advanced ASI,<br>4 = G.703E3,<br>5 = G.703T3,<br>6 = G.703STS-1,<br>7 = HSSI,<br>8 = Parallel DVB,<br>9 = Parallel M2P,<br>10 = None,<br>13 = OC3,<br>14 = STM-1,<br>15 = G.703E2,<br>16 = G.703T2Bal,<br>17 = G.703T2Unbal,<br>18 = G.703E1Bal,<br>19 = G.703E1Unbal,<br>20 = G.703T1AMI<br>21 = G.703T1B8ZS<br>22 = Ethernet<br>**(See table at the end of this command.)** |
| <1> | Input Clock Polarity | 0 = Normal, 1 = Inverted |
| <1> | Data Polarity | 0 = Normal, 1 = Inverted |
| <1> | Input Clock Source | 0 = SCTE, 1 = SCT |
| <1> | Reserved | TBD, Default = 0 |
| <11> | Reserved | TBD |
| <1> | Reserved | TBD |
| <1> | Major Alarm Mask | Bit 0 = Spare<br>Bit 1 = Transmit Oversample PLL Lock<br>Bit 2 = FPGA Config Error<br>Bit 3 = IF Synthesizer PLL Lock<br>Bit 4 = External Reference PLL Lock<br>Bit 5 = Composite PLL Lock<br>Bit 6 = Symbol PLL Lock<br>Bit 7 = Spare<br>0 = Mask, 1 = Allow |
| <1> | Minor Alarm Mask | Bit 0 = Terrestrial Ethernet data activity detect<br>Bit 1 = Loss Terrestrial Clock<br>Bit 2 = Loss Terrestrial Data<br>Bit 3 = FIFO Error<br>Bit 4 = Output Level<br>Bit 5 = Terrestrial Framing Error |

| | | |
|---|---|---|
| | | Bit 6 = Terr Ethernet jitter buffer underflow<br>Bit 7 = Terr Ethernet jitter buffer overflow<br>0 = Mask, 1 = Allow |
| <1> | Common Fault Mask | Bit 0 = -12 V Alarm<br>Bit 1 = +12 V Alarm<br>Bit 2 = +5 V Alarm<br>Bit 3 = Spare<br>Bit 4 = Spare<br>Bit 5 = Spare<br>Bit 6 = Spare<br>Bit 7 = Spare<br>0 = Mask, 1 = Allow |
| <1> | Reserved | TBD, Default = 0 |
| <4> | Symbol Rate | Symbol Rate in Symbols Per Second<br>**(See note at the end of this command.)** |
| <1> | Terrestrial Framing | 0 = 188 Byte, 1 = 204 Byte, 2 = No Framing<br>5 = COP3, 6 = ACM, 7 = Bridge<br>**(See note at the end of this command.)** |
| <1> | Roll Off | 0 = 0.35, 25 = 0.25, 1 = 0.20 |
| <1> | Reserved | TBD |
| <1> | Output Clock Source | 0 = SCTE, 1 = SCT, 2 = None<br>**(See table at the end of this command.)** |
| <1> | Network Spec | 0 = DVB-S<br>9 = DirecTV<br>11 = DVB-S2-CCM<br>13 = DirecTV AMC-NBC<br>15 = DVB-S2-ACM |
| <1> | BB Scrambler Bypass | 0 = Normal, 1 = Bypass |
| <1> | Outer FEC Bypass | 0 = Normal, 1 = Bypass |
| <1> | Test Pattern | 0 = None, 1 = $2^{15} - 1$, 23 = $2^{23}$-1 |
| <1> | Last Rate Control | 0 = Symbol Rate, 1 = Data Rate, 2 = Auto |
| <1> | Interleaver Bypass | 0 = Bypass, 1 = Normal |
| <1> | PCR Restamping | 0 = Off, 1= On |
| <1> | Multi-PIIC Mode | 1 = Manual,<br>2 = Redundancy |

| | | |
|---|---|---|
| <1> | Redundancy Mode | 0 = Force Prime,<br>1 = Force Backup,<br>2 = Manual Revert,<br>3 = Auto-Revert |
| <1> | Prime PIIC Slot | 1 – 3 |
| <1> | Backup PIIC Slot | 1 – 3 |
| <1> | Pilot Symbols | 0 = Off, 1= On |
| <1> | Inner FEC Bypass | 0 = Normal, 1 = Bypass |
| <1> | PL Scrambler Bypass | 0 = Normal, 1 = Bypass |
| <1> | Reserved | Set to 0 |
| <1> | Reserved | Set to 1 |
| <2> | Reserved | Set to 0 |
| <4> | Gold Code Seq Index | 0 to 262142 |
| <1> | Sat Framing | 3=DVB-S, 5=DTV, 10=DVB-S2 Normal, 15=DVB-S2 Short |
| <1> | Auto EQ Enable | 0=Off, 1=On |
| <9> | Auto EQ Filter Coef Name | 8-character NULL terminated string, this is the filter's name as shown on the front panel (identical to the filter's base filename, the extension is assumed to be "AEQ") |

| **DM240XR Clock Source Selection Matrix** | | |
|---|---|---|
| **Interface Type** | **InClk Source** | **OutClk Source** |
| RS-422 Serial | SCT or SCTE | SCT Only |
| G.703 (E3, T3, STS-1) | SCTE Only | SCT, SCTE, or None |
| HSSI | SCT or SCTE | SCT Only |
| OC3 | SCTE Only | None |
| STM-1 | SCTE Only | None |
| ASI, Advanced ASI | SCTE Only | None |
| M2P Parallel | SCT or SCTE | SCT Only |
| DVB Parallel | SCTE Only | SCT Only |

**NOTE**

***When changing Data Rate, Symbol Rate, Inner FEC Rate, Modulation Type, or Terrestrial Framing using the Mod All Command, the Data Rate and Symbol Rate parameter must be range checked using the following formulas to ensure they do not exceed the max limits:***

**Symbol Rate = (Data Rate * Overhead)/(Code Rate * Modulation)**

**Data Rate = (Symbol Rate * Code Rate * Modulation)/Overhead**

| | |
|---|---|
| Maximum Symbol Rate | 68 Msps. |
| Maximum Data Rate | 238 Mbps with high-speed interface card. |
| Overhead | 204/188 for 188 byte<br>204/204 for 204 byte<br>204/187 for none |
| Modulation | QPSK = 2, 16QAM = 4, BPSK = 1, 8PSK = 3 |
| Code Rate | 1/4, 1/3, 2/5, 3/5, 1/2, 2/3, 3/4, 5/6, 6/7, 7/8, 8/9, 9/10 |

**Opcode: <2602h>** Command a Modulator's Frequency

| | | |
|---|---|---|
| <4> | Frequency | Binary Value, units Hz in 1Hz steps.<br>50000000Hz to 180000000Hz 70/140<br>950000000Hz to 2050000000Hz L-Band (This command will cause the carrier to turn off). |

**Opcode: <2604h>** Command a Modulator's Data Rate

| | | |
|---|---|---|
| <4> | Data Rate | Binary Value, 1 BPS steps (This command will cause the carrier to turn off). |

**Opcode: <2606h>** Command a Modulator's Modulation Type

| | | |
|---|---|---|
| <1> | Modulation Type | 0 = QPSK, 1 = BPSK, 2 = 8PSK, 3 = 16QAM, 9 = 16APSK, 10 = 32APSK |

**Opcode: <2607h>** Command a Modulator's Inner FEC Rate

| | | |
|---|---|---|
| <1> | Inner FEC Rate | 1 = 1/2 Rate, 2 = 2/3 Rate, 3 = 3/4 Rate, 4 = 5/6 Rate, 5 = 7/8 Rate, 6 = 6/7 Rate, 7=4/5, 8 = 8/9 Rate, 9 = 9/10 Rate, 128 = 1/4 Rate, 129 = 1/3 Rate, 130 = 2/5 Rate, 131 = 3/5 Rate (This command will cause the carrier to turn off.) |

**Opcode: <2609h>** Command a Modulator's Carrier Control

| | | |
|---|---|---|
| <1> | Carrier Control | 0 = Off, 1 = On |

**Opcode: <260Ah>** Command a Modulator's Carrier Test

| | | |
|---|---|---|
| <1> | Carrier Test | 0 = Normal, 1 = CW, 2 = Dual, 3 = Offset, 4 = Pos FIR, 5 = Neg FIR |

**Opcode: <260Bh>** Command a Modulator's Input Clock Source

| | | |
|---|---|---|
| <1> | Input Clock Source | 0 = SCTE, 1 = SCT |

**Opcode: <260Ch>** Command a Modulator's Input Clock Polarity

| | | |
|---|---|---|
| <1> | Input Clock Polarity | 0 = Normal, 1 = Inverted |

**Opcode: <260Fh>** Command a Modulator's Output Level

| | | |
|---|---|---|
| <2> | Transmit Power Level | Signed Value. 0 to –250 (0.0 to –25.0 dBm) |

**Opcode: <2611h>** Command a Modulator's Spectrum

| | | |
|---|---|---|
| <1> | Spectrum | 0 = Inverted, 1 = Normal |

**Opcode: <2616h>** Command a Modulator's External Reference Source

| | | |
|---|---|---|
| <1> | External Reference Source | 0 = Internal, 1 = External |

**Opcode: <2619h>** Command DM240 Network Spec

| | | |
|---|---|---|
| <1> | Network Spec | 0 = DVB-S<br>11 = DVB-S2-CCM<br>15 = DVB-S2-ACM |

**Opcode: <261Bh>** Command a Modulator's External Reference Frequency

| | | |
|---|---|---|
| <4> | External Reference Frequency | Binary Value, units Hz in 8000Hz steps, e.g. 1000000Hz, 1008000Hz, etc.<br>256000Hz to 10000000Hz |

**Opcode: <2620h>** Command a Modulator's Data Polarity

| | | |
|---|---|---|
| <1> | Data Polarity | 0 = Normal, 1 = Inverted |

**Opcode: <2621h>** Command a Modulator's Interface Type

| | | |
|---|---|---|
| <1> | Tx Interface Type | 0 = Serial,<br>1 = Parallel,<br>2 = ASI,<br>3 = Advanced ASI,<br>4 = G.703E3,<br>5 = G.703T3,<br>6 = G.703STS-1,<br>7 = HSSI,<br>8 = Parallel DVB,<br>9 = Parallel M2P,<br>10 = None,<br>13 = OC3,<br>14 = STM-1,<br>15 = G.703E2,<br>16 = G.703T2Bal,<br>17 = G.703T2Unbal,<br>18 = G.703E1Bal,<br>19 = G.703E1Unbal,<br>20 = G.703T1AMI<br>21 = G.703T1B8ZS<br>22 = Ethernet |

**Opcode: <2640h>** Command a Modulator's Terrestrial Framing

| | | |
|---|---|---|
| <1> | Terrestrial Framing | 0 = 188 Byte, 1 = 204 Byte, 2 = No Framing<br>5 = COP3, 6 = ACM, 7 = Bridge |

**Opcode: <2641h>** Command a Modulator's Roll Off

| | | |
|---|---|---|
| <1> | Roll Off | 0 = 0.35, 25 = 0.25, 1 = 0.20 |

**Opcode: <2642h>** Command a Modulator's Output Clock Source

| | | |
|---|---|---|
| <1> | Output Clock Source | 0 = SCTE, 1 = SCT, 2 = None |

**Opcode: <2643h>** Command a Modulator's Symbol Rate

| | | |
|---|---|---|
| <1> | Symbol Rate | Binary Value, 1bps Steps (This command will cause the carrier to turn off. |

**Opcode: <2656h>** Command AASI NULL PID

| | | |
|---|---|---|
| <2> | PID | 0x0010 - 0x1FFF |

**Opcode: <2657h>** Command IPSat Burst Demod Count

| | | |
|---|---|---|
| <2> | Num Burst Demods | 1 – 50 |

**Opcode: <2658h>** Command IPSat Control PID

| | | |
|---|---|---|
| <2> | PID | 0x0010 - 0x1FFF |

**Opcode: <2659h>** Command IPSat Enable

| | | |
|---|---|---|
| <1> | IPSat Enable | 0 = OFF, 1 = ON |

**Opcode: <265Bh>** Command PCR Restamping

| | | |
|---|---|---|
| <1> | PCR Restamping | 0 = Off, 1= On |

**Opcode: <265Ch>** Command Multi-PIIC Configuration

| | | |
|---|---|---|
| <1> | Multi-PIIC Mode | 1 = Manual,<br>2 = Redundancy |
| <1> | Redundancy Mode | 0 = Force Prime,<br>1 = Force Backup,<br>2 = Manual Revert,<br>3 = Auto-Revert |
| <1> | Prime PIIC Slot | 1 – 3 |
| <1> | Backup PIIC Slot | 1 – 3 |

**Opcode: <2C03h>** Command Clear Latched Alarms

| | | |
|---|---|---|
| | | No Parameters |

**Opcode: <2C04h>** Command Set Time

| | | |
|---|---|---|
| <1> | Hour | 0 – 23 |
| <1> | Minute | 0 – 59 |
| <1> | Second | 0 – 59 |

**Opcode: <2C05h>** Command Set Date

| | | |
|---|---|---|
| <1> | Year | 00 – 99 |
| <1> | Month | 1 – 12 |
| <1> | Day | 1 – 31 |

**Opcode: <2C06h>** Command Set Time and Date

| | | |
|---|---|---|
| <1> | Year | 00 – 99 |
| <1> | Month | 1 – 12 |
| <1> | Day | 1 – 31 |
| <1> | Hour | 0 – 23 |
| <1> | Minute | 0 – 59 |
| <1> | Second | 0 – 59 |

**Opcode: <2F40h>** Command RF Redundancy Mode

| | | |
|---|---|---|
| <1> | Redundancy Mode | 3 = auto-revert, 4 = manual, 5 = backup |

**Opcode: <2F41h >** Command RF Fault Test

| | | |
|---|---|---|
| <1> | Fault Test | 0 = normal, 1 = faulted |

**Opcode: <2F42h >** Command RF Activate Side

| | | |
|---|---|---|
| <1> | Activate Side | 0 = backup, 1 = prime |

# Chapter 10. Web Browser

## 10.1 Web Browser User Interface

The Web Browser user interface is available on the DM240XR. The Web Browser interface can be accessed through the RJ45, SNMP port located on the unit. This section is primarily designed to illustrate all the menus associated with the Web Browser and will give full descriptions and details of these features.

***The Web Browser menus for the DM240XR can only be accessed utilizing Microsoft Internet Explorer 6 or greater.***

## 10.2 Configuring Your PC

An example of the GUI layout is shown in Figure 10-1, showing the location and labeling of the Interface. The graphical user interface is designed to replicate the front panel. For users familiar with the front panel interface adjusting to the GUI interface should be seamless. The GUI Interface is divided into four functional areas: the Front Panel Display simulation, Gel-tab area, information/data entry and product information and contact area.

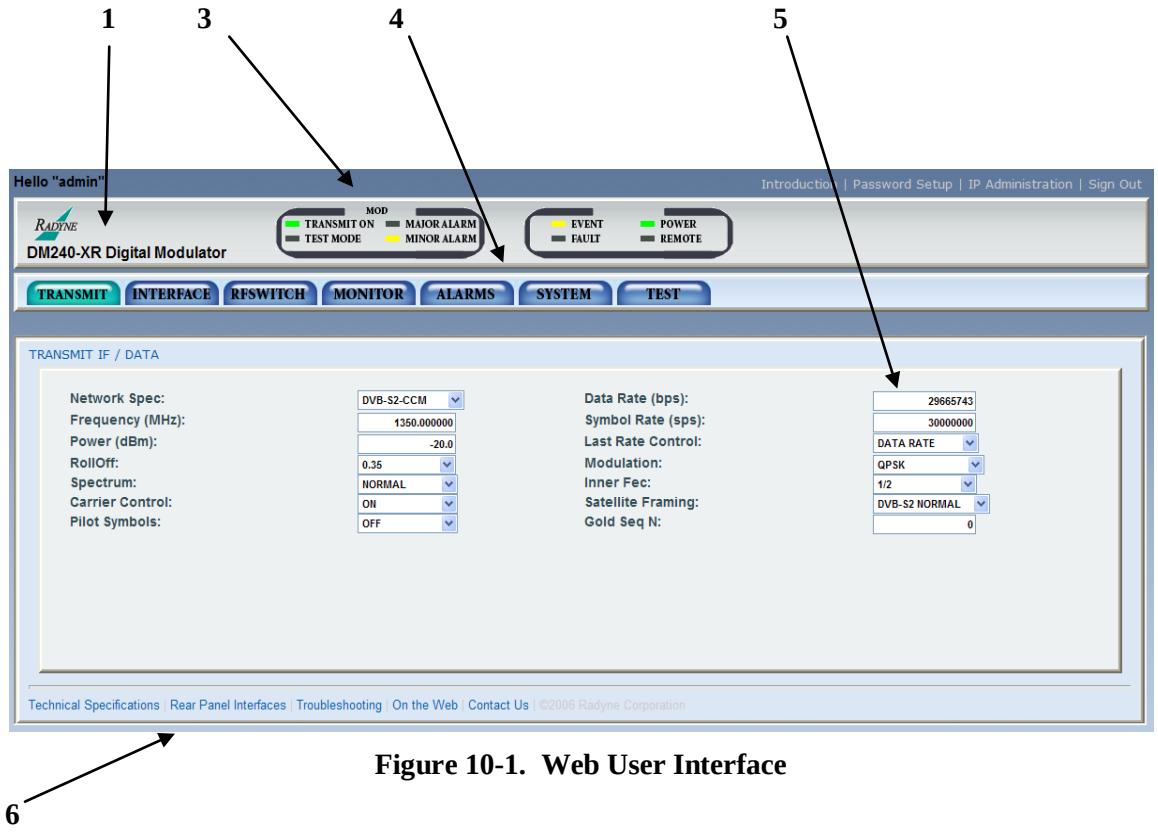



**Figure 10-1. Web User Interface**

| Table 10-1. | | |
|---|---|---|
| **Item Number** | **Description** | **Function** |
| 1 | Product Name | This describes what product is that the interface is connected to. |
| 2 | Product Name/Location | This can be used by the user to identify the unit. |
| 3 | Alarm and Monitor | Displays fault status and performance monitoring of unit. |
| 4 | Gel-Tab Area | This area allows access to data and control input of unit. Moving the cursor across the Gel-Tabs drop down menus appear and allow editing of the data entry area. |
| 5 | Data Entry Area | Parameter editing is done in this area. |
| 6 | Product Information<br>Contact Information | Access to technical trouble-shooting, product options and specifications is accomplished by selecting one and clicking on that function. Contacting Radyne via Email is possible by clicking on “Contact Us”. |

## 10.2.1 LED Indicators

Twelve LEDs on the GUI Interface (Refer to Table 10-2) indicate the status of the modems operation. The LED colors maintain a consistent meaning. Green is appropriate for normal operation, Yellow means that there is a condition not proper for normal operation, and Red indicates a fault condition that will result in lost communications.

| Table 10-2. | | |
|---|---|---|
| **LED** | **Color** | **Function** |
| **Modem LED Indicators** | | |
| Power | Green | Indicates that the unit is turned on. |
| Fault | Red | Indicates a hardware fault for the unit. |
| Event | Yellow | Indicates that a condition or event has occurred that the modem has stored in memory. The events may be viewed from the GUI or in the Terminal Mode. |
| Remote | Green | Indicates that the unit is in the process of updating firmware with FTP. |

| Modulator LED Indicators | | |
|---|---|---|
| Transmit On | Green | Indicates that the Modulator transmitter is on. |
| Major Alarm | Red | Indicates that the Transmit Direction has failed, losing traffic. |
| Minor Alarm | Yellow | Indicates that a Transmit Warning Condition exists. |
| Test Mode | Yellow | Indicates that the transmitter is involved in a current Test Mode activity. |

## 10.3 GUI Screen Menus

There are four main menus displayed on the Introduction screen upon startup of the web browser. This screen will give a brief overview of the product and contains no configurable items. The four main menu's and with submenus are:

- **Introduction**

- **Password Setup**
  - Access
  - Preferences

- **IP Administration**
  - Modem Addressing
  - Configure Apps
  - Configure PC

- **Monitor and Control**
  - Transmit
  - Interface
  - RFswitch
  - Monitor
  - Alarms
  - System
  - Test

## 10.3.1 Introduction Menu

This menu will first appear when starting up the web browser. This page lists the general features of the unit, and lists a brief description of the unit. Notice on the bottom of the page that there are selections for Technical Specifications, Product Options, Troubleshooting, About Us, and Contact us. Access these areas for further detailed description of the selection.

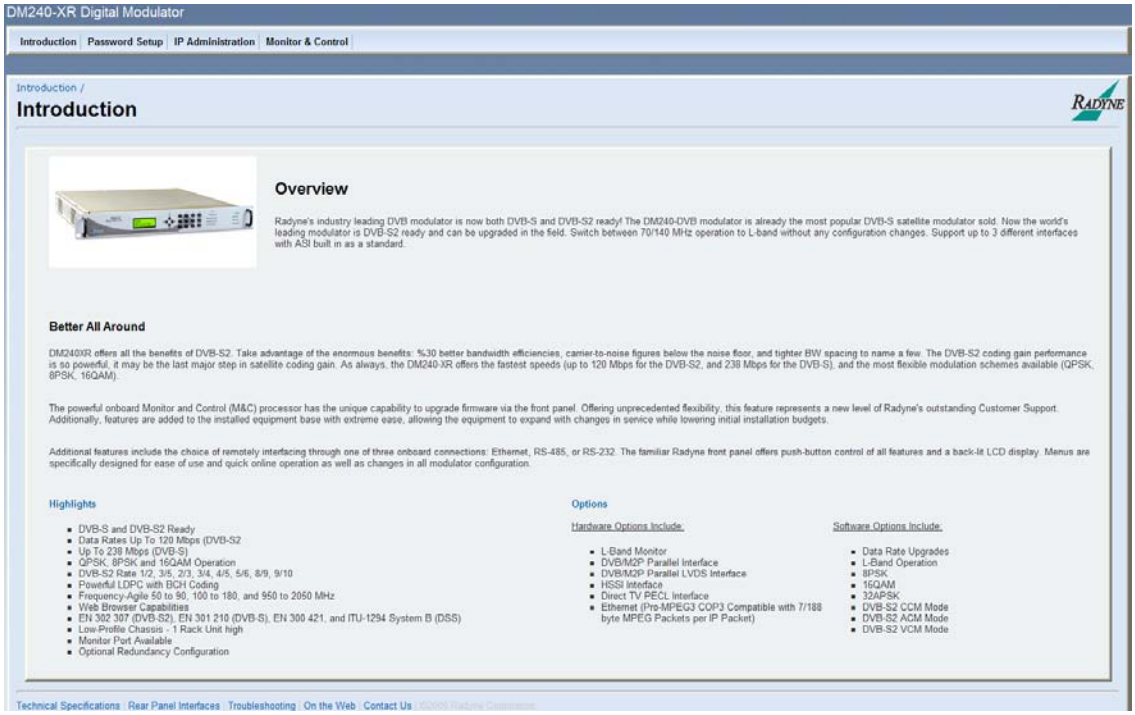

DM240-XR Digital Modulator
Introduction
Password Setup
IP Administration
Monitor & Control
Introduction /
Introduction
RADYNE
Overview
Radyne's industry leading DVB modulator is now both DVB-S and DVB-S2 ready! The DM240-DVB modulator is already the most popular DVB-S satellite modulator sold. Now the world's leading modulator is DVB-S2 ready and can be upgraded in the field. Switch between 70/140 MHz operation to L-band without any configuration changes. Support up to 3 different interfaces with ASI built in as a standard.
Better All Around
DM240XR offers all the benefits of DVB-S2. Take advantage of the enormous benefits: %30 better bandwidth efficiencies, carrier-to-noise figures below the noise floor, and tighter BW spacing to name a few. The DVB-S2 coding gain performance is so powerful, it may be the last major step in satellite coding gain. As always, the DM240-XR offers the fastest speeds (up to 120 Mbps for the DVB-S2, and 238 Mbps for the DVB-S), and the most flexible modulation schemes available (QPSK, 8PSK, 16QAM).
The powerful onboard Monitor and Control (M&C) processor has the unique capability to upgrade firmware via the front panel. Offering unprecedented flexibility, this feature represents a new level of Radyne's outstanding Customer Support. Additionally, features are added to the installed equipment base with extreme ease, allowing the equipment to expand with changes in service while lowering initial installation budgets.
Additional features include the choice of remotely interfacing through one of three onboard connections: Ethernet, RS-485, or RS-232. The familiar Radyne front panel offers push-button control of all features and a back-lit LCD display. Menus are specifically designed for ease of use and quick online operation as well as changes in all modulator configuration.
Highlights
DVB-S and DVB-S2 Ready
Data Rates Up To 120 Mbps (DVB-S2
Up To 238 Mbps (DVB-S)
QPSK, 8PSK and 16QAM Operation
DVB-S2 Rate 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10
Powerful LDPC with BCH Coding
Frequency-Agile 50 to 90, 100 to 180, and 950 to 2050 MHz
Web Browser Capabilities
EN 302 307 (DVB-S2), EN 301 210 (DVB-S), EN 300 421, and ITU-1294 System B (DSS)
Low-Profile Chassis - 1 Rack Unit high
Monitor Port Available
Optional Redundancy Configuration
Options
Hardware Options Include:
L-Band Monitor
DVB/M2P Parallel Interface
DVB/M2P Parallel LVDS Interface
HSSI Interface
Direct TV PECL Interface
Ethernet (Pro-MPEG3 COP3 Compatible with 7/188 byte MPEG Packets per IP Packet)
Software Options Include:
Data Rate Upgrades
L-Band Operation
8PSK
16QAM
32APSK
DVB-S2 CCM Mode
DVB-S2 ACM Mode
DVB-S2 VCM Mode
Technical Specifications | Rear Panel Interfaces | Troubleshooting | On the Web | Contact Us

**Figure 10.2. Introduction Screen**

### 10.3.1.1 Login Screen

Upon initially accessing either the Setup, Monitor & Control, or Administration configuration menu tabs a login prompt will appear. In order to gain access to any of the configuration menus, log in with the correct user name and password. (The factory default login name is “admin” and the default password is “admin”). For further information on setting user profiles see Section 10.3.3
IP and Application Administration Menu.

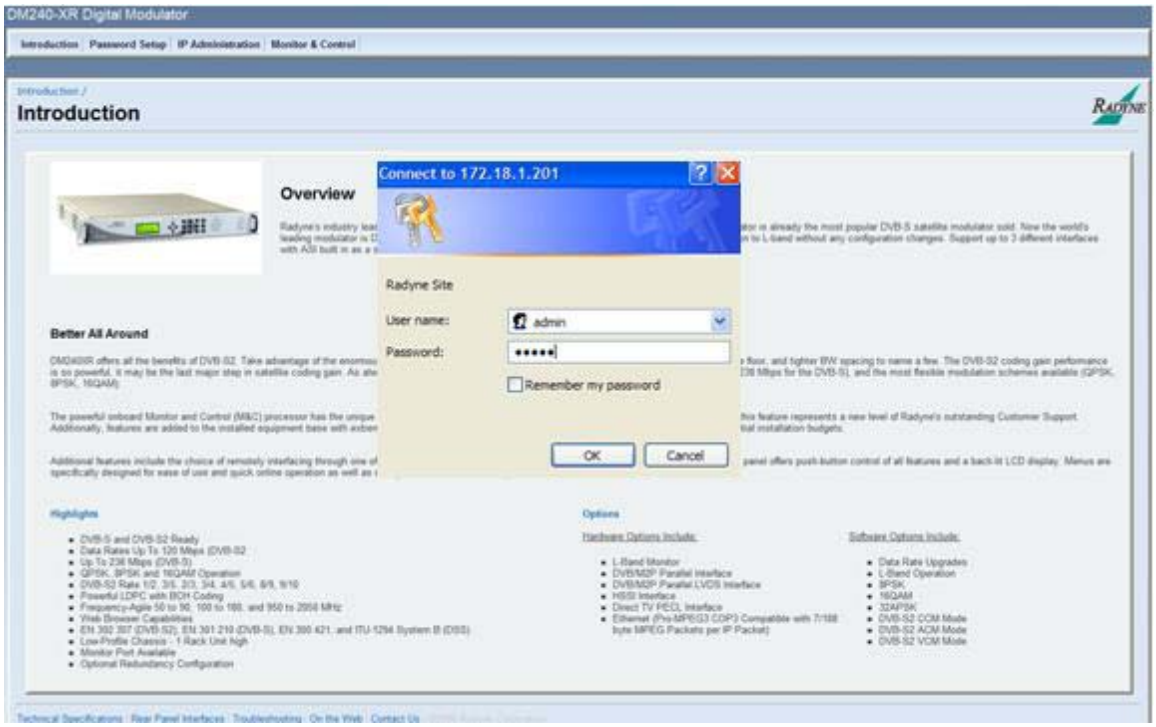



**Figure 10-3. Login Screen**

## 10.3.2 Password Setup

The Password Access Menu allows for multiple operators to be allowed access to the system. User access priorities can be set be completing the fields in the Access menu below.

### Access Menu

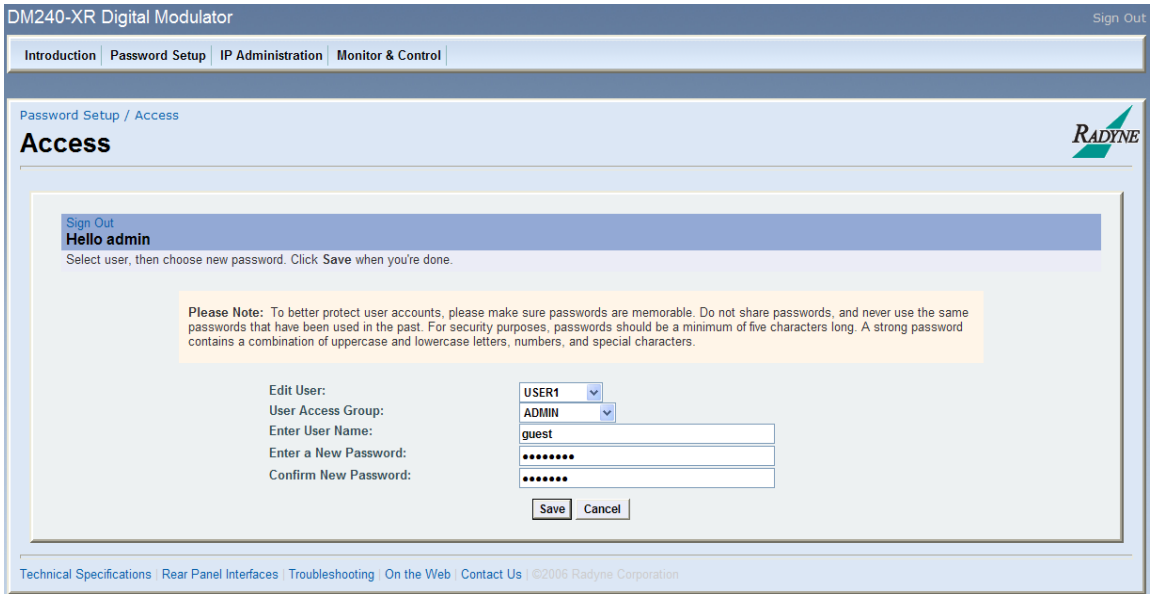

DM240-XR Digital Modulator
Sign Out
Introduction
Password Setup
IP Administration
Monitor & Control
Password Setup / Access
Access
RADYNE
Sign Out
Hello admin
Select user, then choose new password. Click Save when you're done.
Please Note: To better protect user accounts, please make sure passwords are memorable. Do not share passwords, and never use the same passwords that have been used in the past. For security purposes, passwords should be a minimum of five characters long. A strong password contains a combination of uppercase and lowercase letters, numbers, and special characters.
Edit User:
USER1
User Access Group:
ADMIN
Enter User Name:
guest
Enter a New Password:
Confirm New Password:
Save
Cancel
Technical Specifications
Rear Panel Interfaces
Troubleshooting
On the Web
Contact Us
©2006 Radyne Corporation

**Figure 10-4. Access Menu**

**Edit User** — **{USER 1, USER 2, USER 3}**
Allows the operator to assign the applicable user group.

**User Access Group** — **{Guest, Operator, Admin}**
Allows the operator to assign the applicable user Access Level group.

**Enter User Name** — Allows the operator to assign the applicable user name used for login.

**Enter a New Password** — Allows the operator to assign the applicable user name password used for login.

**Confirm New Password** — Allows the operator to confirm the applicable user password (this must exactly match the previously entered Password entry for the system to accept).

## Preferences Menu

**Figure 10-5. Preferences menu**

**User Confirmation:** **{DISABLED, ENABLED}**
The user information preference allows the user to force/disable confirmation of all changes through the web interface. This does not override bandwidth confirmations. However, these are always enabled.

## 10.3.3 IP and Application Administration

The IP and Application menu provides instructions on how to configure the modem, applications and PC.

### Modem Addressing

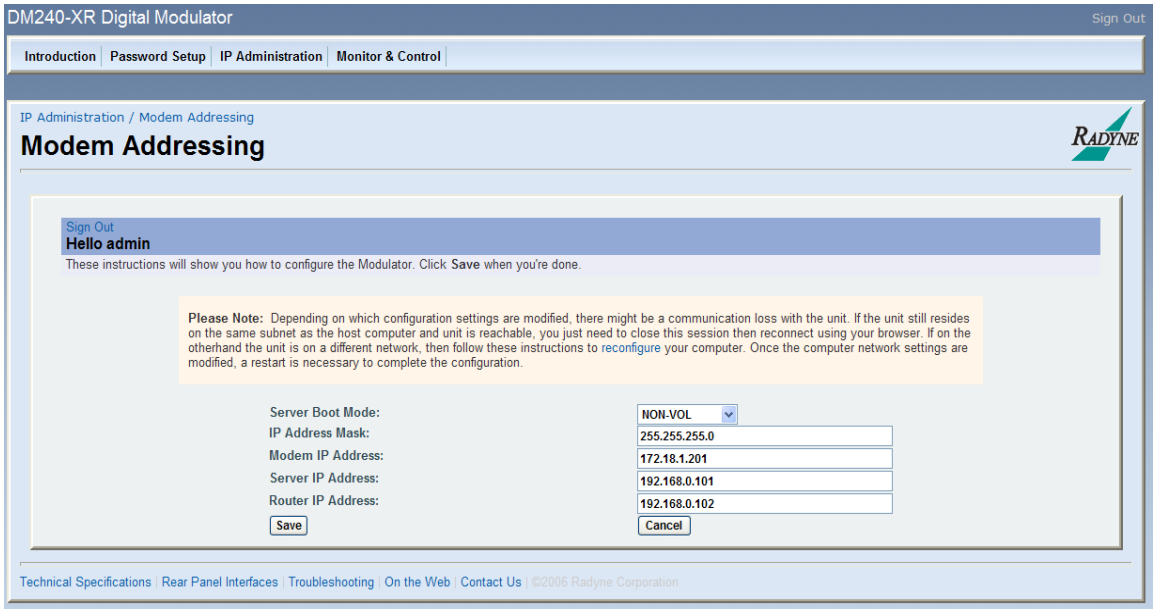

DM240-XR Digital Modulator
Sign Out
Introduction
Password Setup
IP Administration
Monitor & Control
IP Administration / Modem Addressing
Modem Addressing
RADYNE
Sign Out
Hello admin
These instructions will show you how to configure the Modulator. Click Save when you're done.
Please Note: Depending on which configuration settings are modified, there might be a communication loss with the unit. If the unit still resides on the same subnet as the host computer and unit is reachable, you just need to close this session then reconnect using your browser. If on the otherhand the unit is on a different network, then follow these instructions to reconfigure your computer. Once the computer network settings are modified, a restart is necessary to complete the configuration.
Server Boot Mode:
NON-VOL
IP Address Mask:
255.255.255.0
Modem IP Address:
172.18.1.201
Server IP Address:
192.168.0.101
Router IP Address:
192.168.0.102
Save
Cancel
Technical Specifications
Rear Panel Interfaces
Troubleshooting
On the Web
Contact Us
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**Figure 10-6. Modem Addressing**

**Server Boot Mode:** **{DEFAULT, NON-VOL, BOOTP, IP TEST}**

**Default:** All of the following parameters as shown in Table 3-3 through 3-7 will be set and will not change until the boot mode is changed.

**IP**

| | |
|---|---|
| IPMASK: | 255.000.000.000 |
| MODEM IPADDR: | 010.000.000.001 |
| SERVER IP ADDR: | 010.001.001.001 |
| ROUTER IP ADDR: | 010.000.001.001 |

**Table 10-3. IP Parameters**

**SNMP**

| | | | |
|---|---|---|---|
| SNMP VERSION: V1 & V2 | | | |
| TRAP VERSION: V1 | | | |
| AUTHORIZATION: TRAPS OFF | | | |
| RD COMMUNITY: public | | | |
| RDWR COMMUNITY: public | | | |
| USER 1<br>Viewer-md5 | USER 2<br>Viewer-sha | USER 3<br>Oper-md5 | USER 4<br>Oper-sha |
| ACCESS GROUP<br>VIEWER | ACCESS GROUP<br>VIEWER | ACCESS GROUP<br>OPER | ACCESS GROUP<br>OPER |
| AUTH PASSWORD<br>Viewer | AUTH PASSWORD<br>Viewer | AUTH PASSWORD<br>Oper | AUTH PASSWORD<br>Oper |
| PRIV PASSWORD<br>Viewer | PRIV PASSWORD<br>Viewer | PRIV PASSWORD<br>Oper | PRIV PASSWORD<br>Oper |
| AUTHENTICATIO N<br>MD5 | AUTHENTICATIO N<br>SHA | AUTHENTICATIO N MD5 | AUTHENTICATIO N SHA |
| PRIVACY<br>DES | PRIVACY<br>DES | PRIVACY<br>DES | PRIVACY<br>DES |

**Table 10-4. SNMP Parameters**

**FTP**

| | |
|---|---|
| USER ID: | User |
| PASSWORD: | Password |

**Table 10-5. FTP Parameters**

**WEB**

| | | |
|---|---|---|
| Confirmation: disabled | | |
| USER 1<br>guest | USER 2<br>oper | USER 3<br>admin |
| ACCESS GROUP<br>GUEST | ACCESS GROUP<br>OPER | ACCESS GROUP<br>ADMIN |
| AUTH PASSWORD<br>guest | AUTH PASSWORD<br>guest | AUTH PASSWORD<br>admin |

**Table 10-6. Web Parameters**

**TERMINAL AND REMOTE PORT**

| | |
|---|---|
| Type | VT100 |
| baud rate | 19200 |
| interface | rs232 |
| remote control | terminal |

**Table 10-7. Terminal and Remote Port Parameters**

**NON-VOL:** Stores and uses IP Mask and addresses as provided by the user.

**BOOTP:** At boot time, use Bootp Protocol to get names, masks, and IP Addresses of the modem, router, and server.

**IP TEST:** The IP Test boot mode has a similar behavior to the default boot mode. The Terminal, IP, SNMP, FTP and Web parameters changed by the default setting will also be reset by the IP Test boot mode. However, instead of the IP addresses being set to an unreadable address, it will be set as follows as shown in Table 3-8:

**IP TEST**

| | |
|---|---|
| IP ADDRESS MASK: | 255.255.255.0 |
| MODEM IP ADDRESS: | 192.168.000.238 |
| SERVER IP ADDRESS | 192.168.000.101 |
| ROUTER IP ADDRESS: | 192.168.000.102 |

**Table 10-8. IP Test**

**IP Address Mask:** **{XXX.XXX.XXX.XXX}**
The IP Address Mask of the local network. The mask is expressed in a decimal format, and must be a valid TCP/IP Mask. This field should be set before changes are made to the Modem or Router Address.

**Modem IP Address:** **{XXX.XXX.XXX.XXX}**
The IP Address of the modem. This address should be consistent for the mask defined. This address is expressed in decimal format. Broadcast and loop back addresses will not be allowed. These are addresses with all subnet bits set to 0's or 1's.

**Server IP Address:** **{XXX.XXX.XXX.XXX}**
The IP Address of the Boot Server and the address of the SNMP Trap Server when SNMP is active. If a server is used and there is no local router, this address must be consistent with the modem address. If a router has been specified, the address is presumed to be reachable via the router. Broadcast and loop back addresses will not be allowed. These are addresses with all subnet bits set to 0's or 1's.

**Router IP Address:** **{XXX.XXX.XXX.XXX}**

The IP Address of the Local Network Router. If a router is present on the local network, this address must be consistent with the IP Mask and the subnet of the modem. If no router is present, then the address should be set to a foreign address. This address is expressed in decimal format. Broadcast and loop back addresses will not be allowed. These are addresses with all subnet bits set to 0's or 1's.

## Configuring Applications

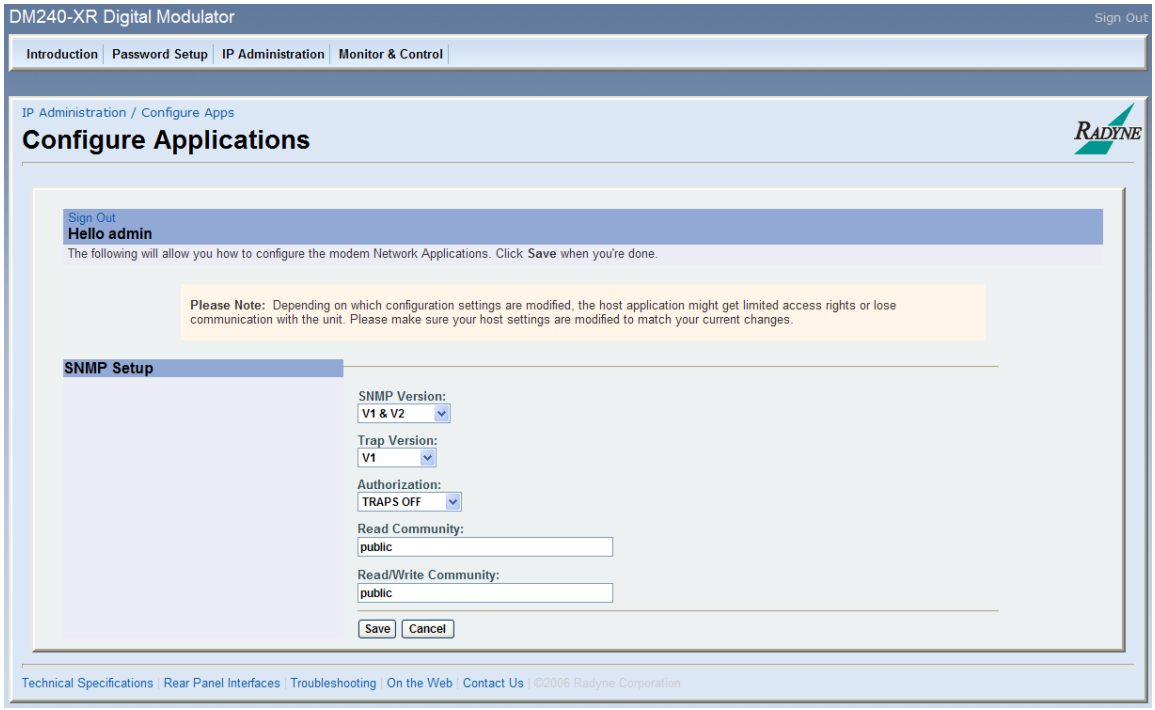

DM240-XR Digital Modulator
Sign Out
Introduction
Password Setup
IP Administration
Monitor & Control
IP Administration / Configure Apps
Configure Applications
RADYNE
Sign Out
Hello admin
The following will allow you how to configure the modem Network Applications. Click Save when you're done.
Please Note: Depending on which configuration settings are modified, the host application might get limited access rights or lose communication with the unit. Please make sure your host settings are modified to match your current changes.
SNMP Setup
SNMP Version:
V1 & V2
Trap Version:
V1
Authorization:
TRAPS OFF
Read Community:
public
Read/Write Community:
public
Save
Cancel
Technical Specifications | Rear Panel Interfaces | Troubleshooting | On the Web | Contact Us | ©2006 Radyne Corporation

**Figure 10-7. Configuring Applications**

**SNMP Setup:**

**SNMP Version:** **{V1 & 2, V3} Default = V1 & V2**

**Trap Version:** **{V1 & 2} Default = V1**

**Authorization:** **{TRAPS ON, TRAPS OFF} Default = TRAPS OFF**

**Read Community:** **{Public} Default**

**Read/Write Community:** **{Public} Default**

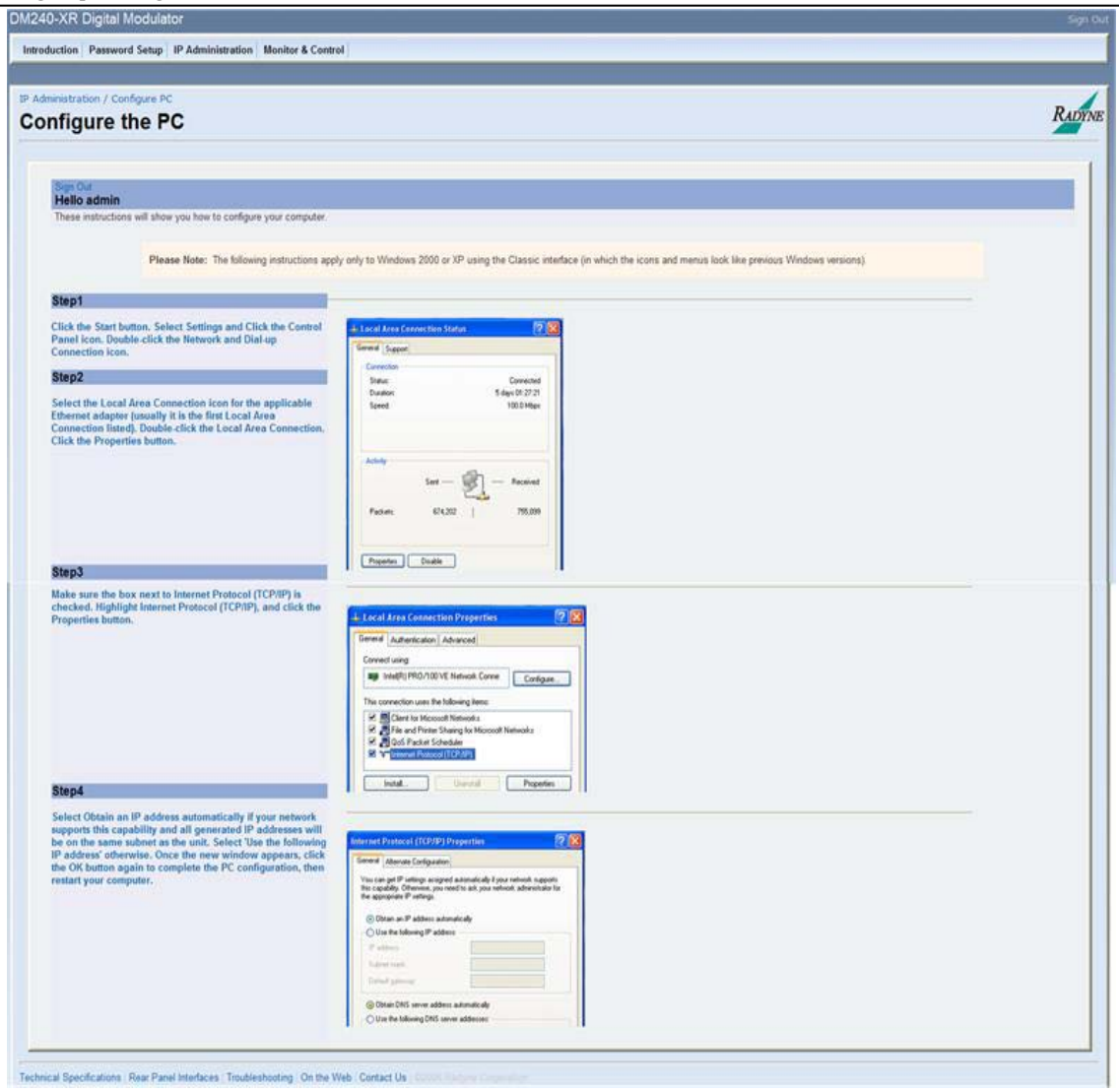

DM240-XR Digital Modulator
Sign Out
Introduction
Password Setup
IP Administration
Monitor & Control
IP Administration / Configure PC
Configure the PC
RADYNE
Sign Out
Hello admin
These instructions will show you how to configure your computer.
Please Note: The following instructions apply only to Windows 2000 or XP using the Classic interface (in which the icons and menus look like previous Windows versions)
Step1
Click the Start button. Select Settings and Click the Control Panel icon. Double-click the Network and Dial-up Connection icon.
Step2
Select the Local Area Connection icon for the applicable Ethernet adapter (usually it is the first Local Area Connection listed). Double-click the Local Area Connection. Click the Properties button.
Step3
Make sure the box next to Internet Protocol (TCP/IP) is checked. Highlight Internet Protocol (TCP/IP), and click the Properties button.
Step4
Select Obtain an IP address automatically if your network supports this capability and all generated IP addresses will be on the same subnet as the unit. Select 'Use the following IP address' otherwise. Once the new window appears, click the OK button again to complete the PC configuration, then restart your computer.
Local Area Connection Status
Local Area Connection Properties
Internet Protocol (TCP/IP) Properties
Technical Specifications
Rear Panel Interfaces
Troubleshooting
On the Web
Contact Us

**Figure 10-8. Configuring The PC**

### 10.3.4 Monitor and Control Menu

Under this menu, all modem functions that are monitored and/or controlled are accessible. To access the M&C sub menu options drag the cursor across the gel-tabs. Note that as the cursor passes over a tab it is highlighted and a menu drops below the tab. Stop on the desired tab move the cursor down and then across to the desired function. Select the desired sub menu function and the data entry menu will appear in the data entry section allowing for adjustments to the parameters displayed.

#### 10.3.4.1 Transmit Menu

The Transmit menu contains sub menu TX IF / Data, Equalizer.

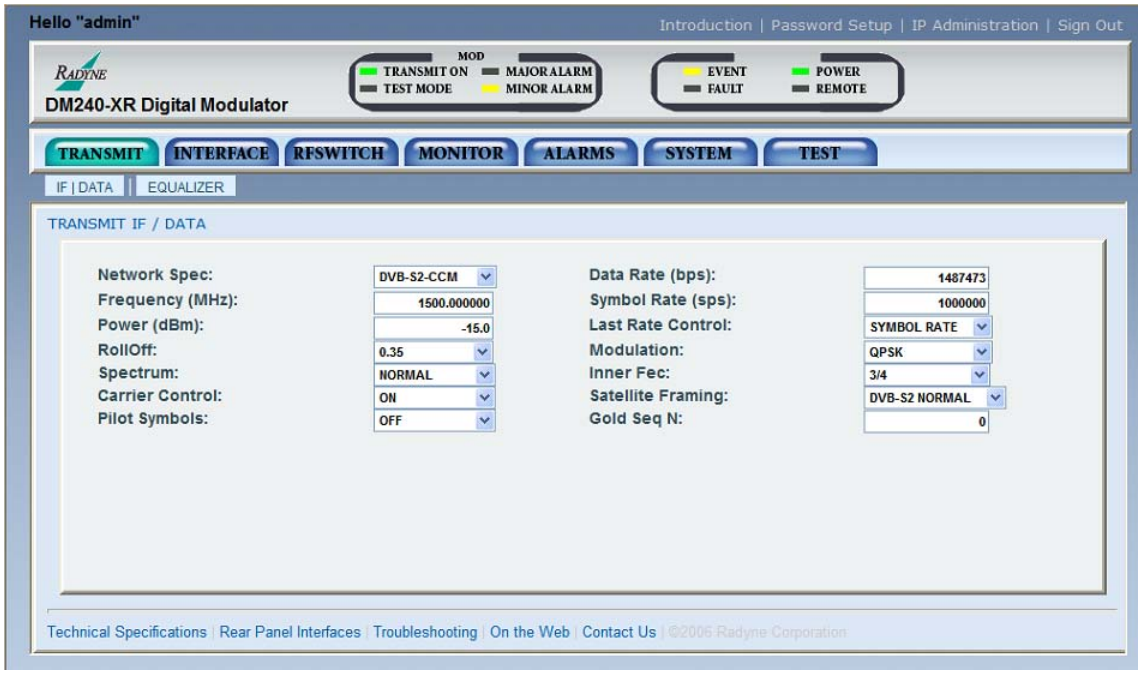



**Figure 10-9. TX IF / Data Menu**

**Figure 10-10. Equalizer Menu**

### 10.3.4.2 Interface Menu

The Interface menu contains sub menus; Terr | Redundancy, Ethernet.

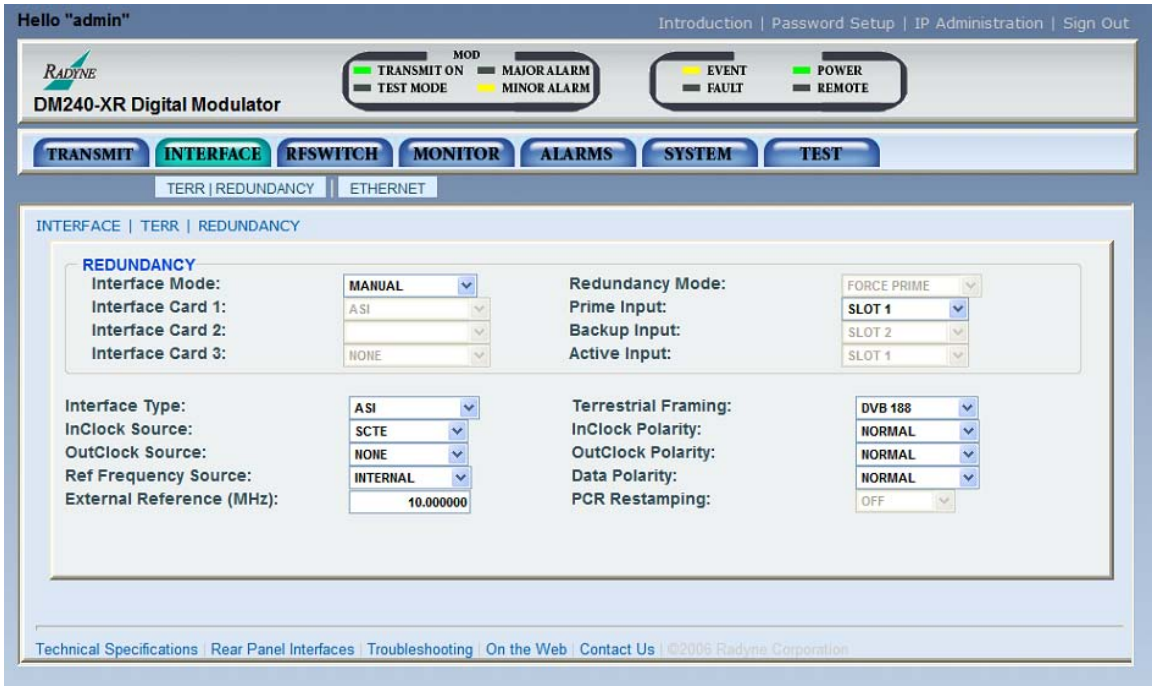



**Figure 10-11. Terr | Redundancy Menu**

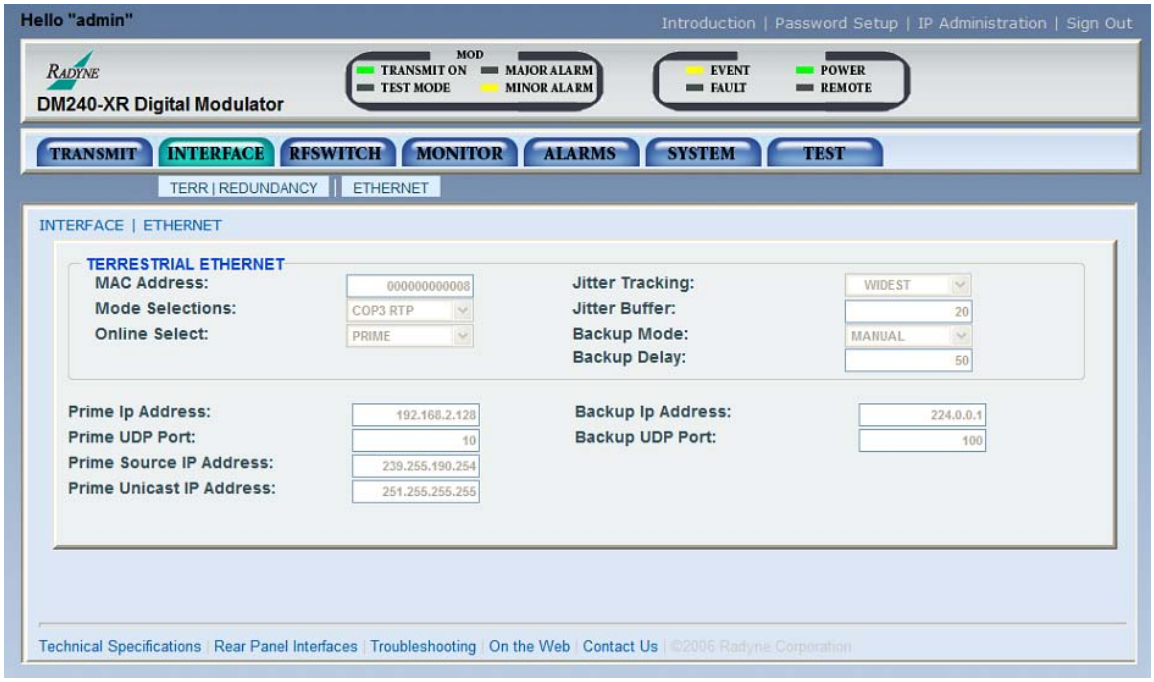



**Figure 10-12. Ethernet Menu**

### 10.3.4.3 RFSWITCH Menu

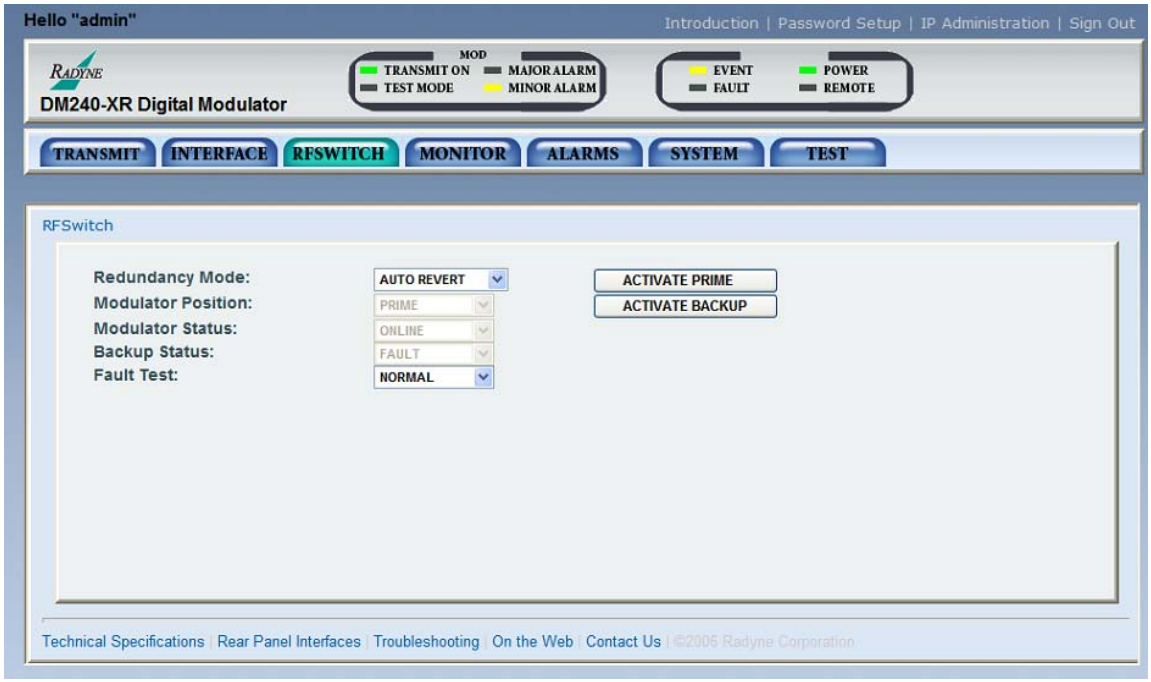



**Figure 10-13. RFSWITCH Menu**

### 10.3.4.4 Monitor Menu

The Monitor menu contains sub menus; Voltages, Event Buffer, Terr Ethernet.

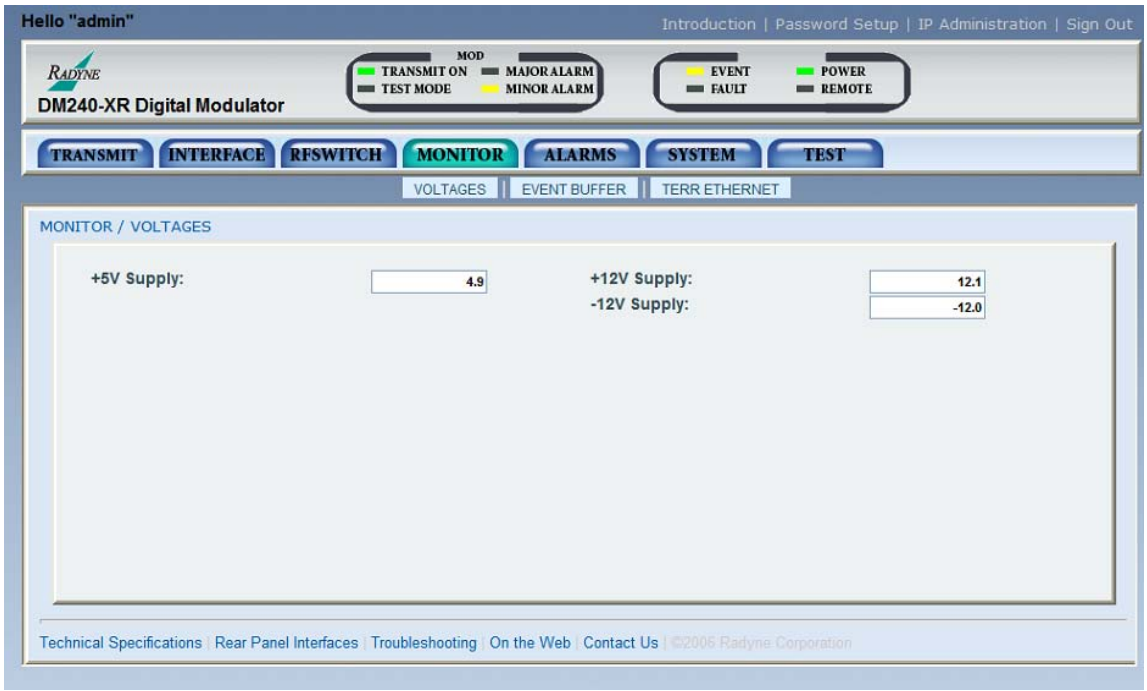



**Figure 10-14. Voltages Menu**

**Figure 10-15. Event Buffer Menu**

**Delete All:** Cleans the entire event buffer.

**Event Type:**

| | |
|---|---|
| I | Informational |
| Y | Yellow alarm. Indicates a transmit or receive warning condition. |
| R | Red alarm. Indicates a transmit or receive failure, losing traffic. |

IMPORTANT

***The Event Buffer may be sorted by warning level, time, date, or event description. This feature may be used to further investigate event occurrences.***

**Figure 10-16. Terr Ethernet Menu**

## 10.3.4.5 Alarms Menu

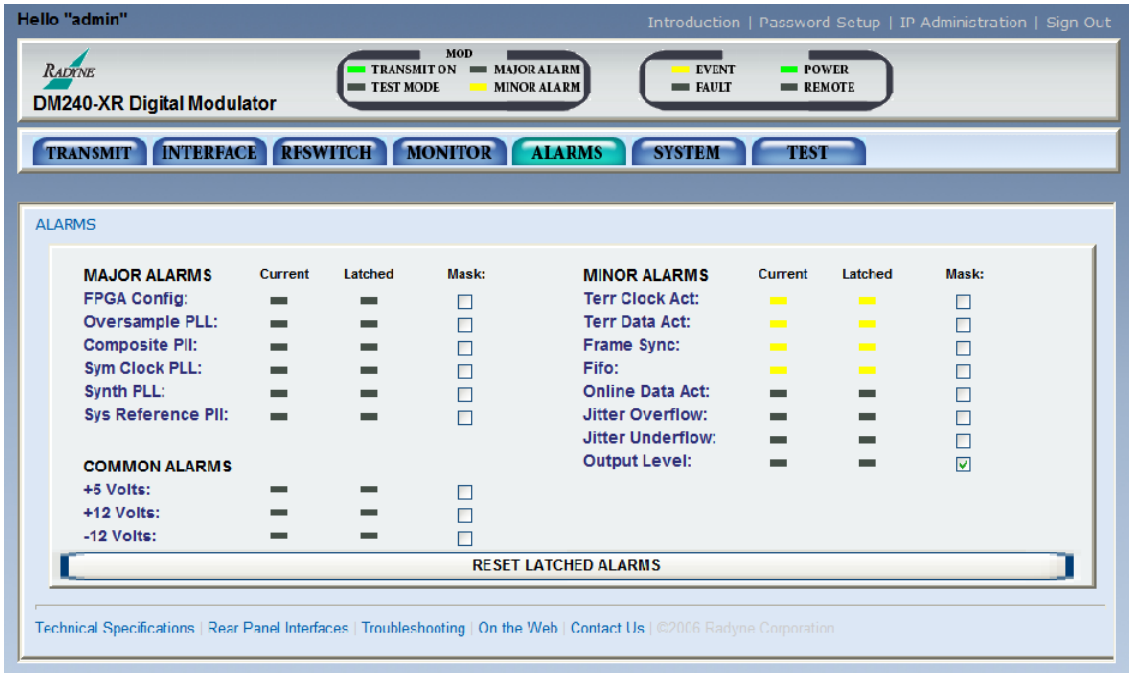



**Figure 10-17. Alarms Menu**

**RESET LATCHED ALARMS:** Clicking on this button will reset (Clear) all Latched Alarms

### 10.3.4.6 System Menu

The System menu contains sub menus; Terminal & Remote, HW/FW Config, Features.

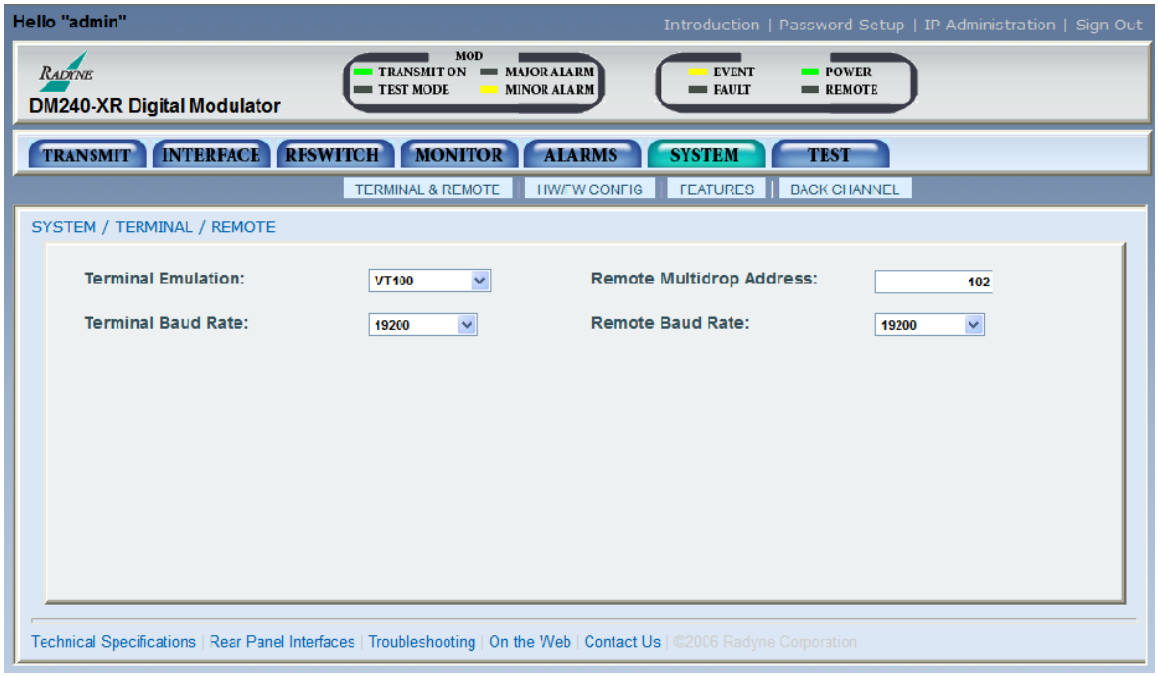



**Figure 10-18. Terminal & Remote Menu**

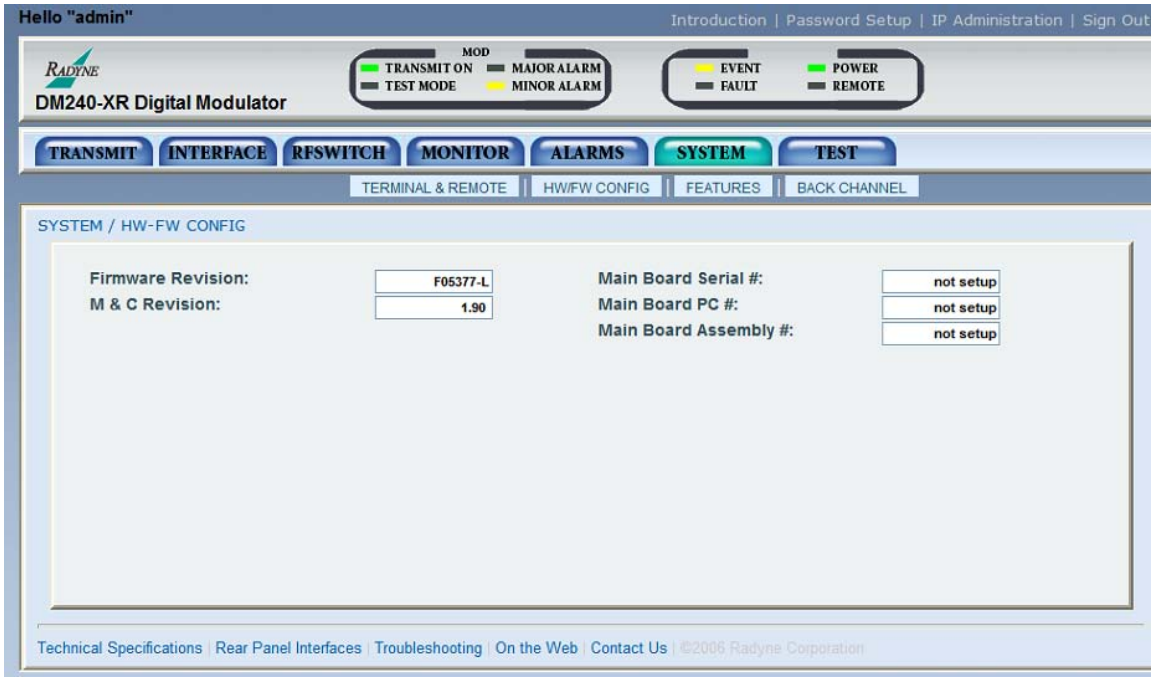



**Figure 10-19. HW/FW Config Menu**

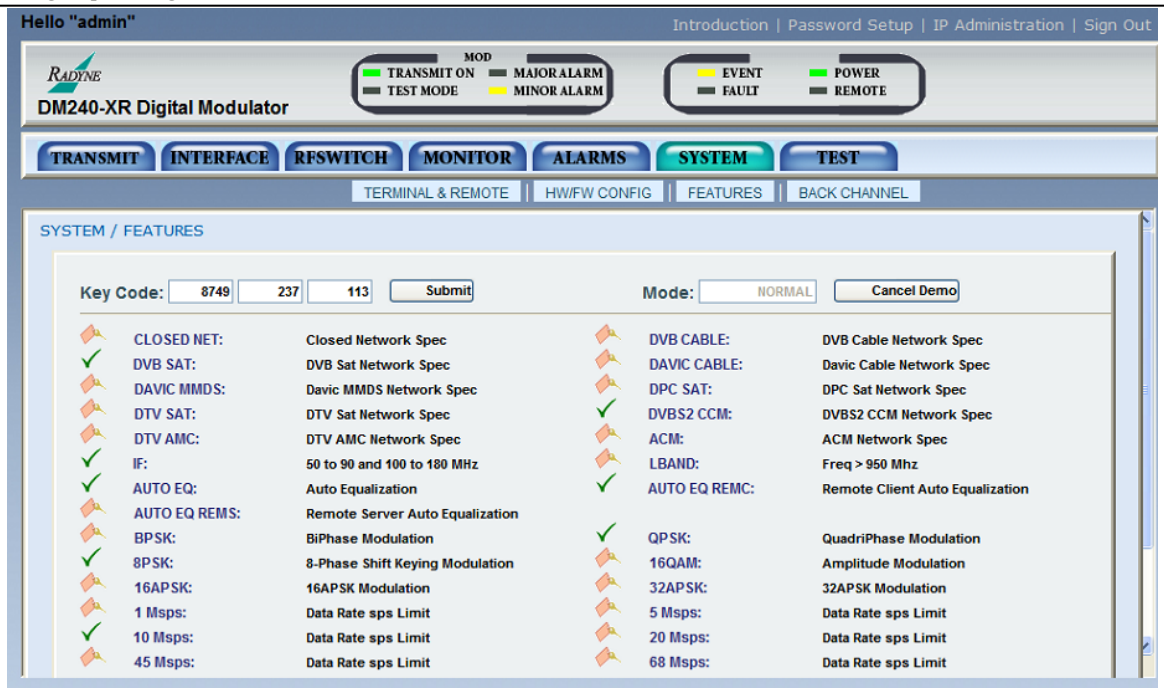



**Figure 10-20. Features Menu W/Key Code**

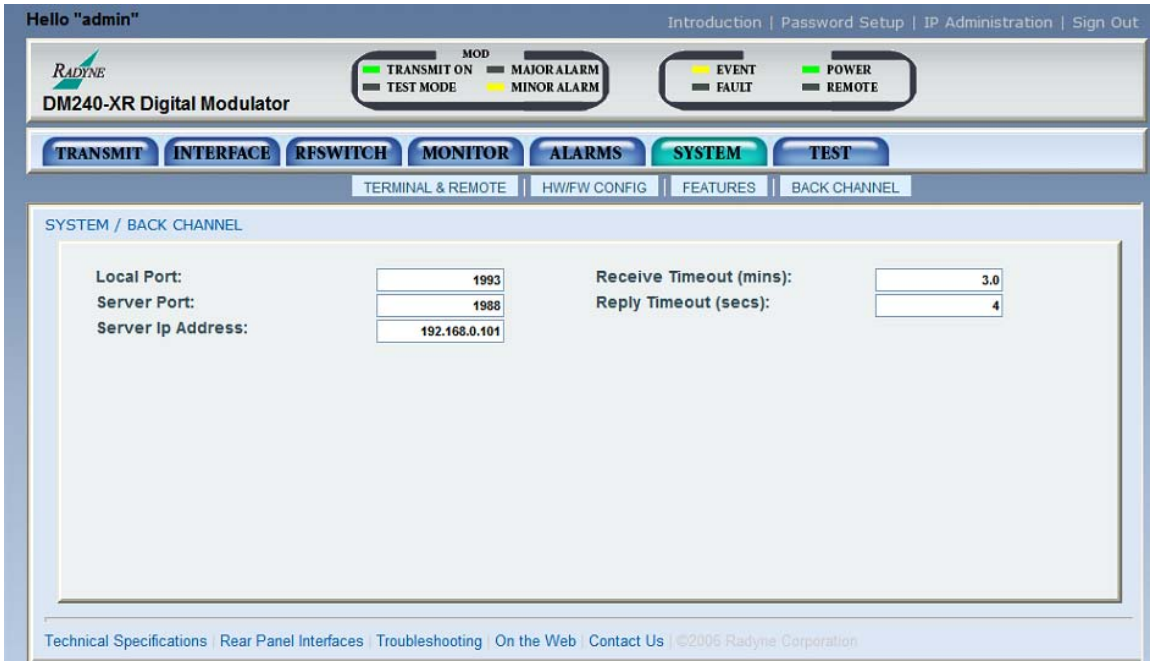



**Figure 10-21. Back Channel Menu**

### 10.3.4.7 Test Menu

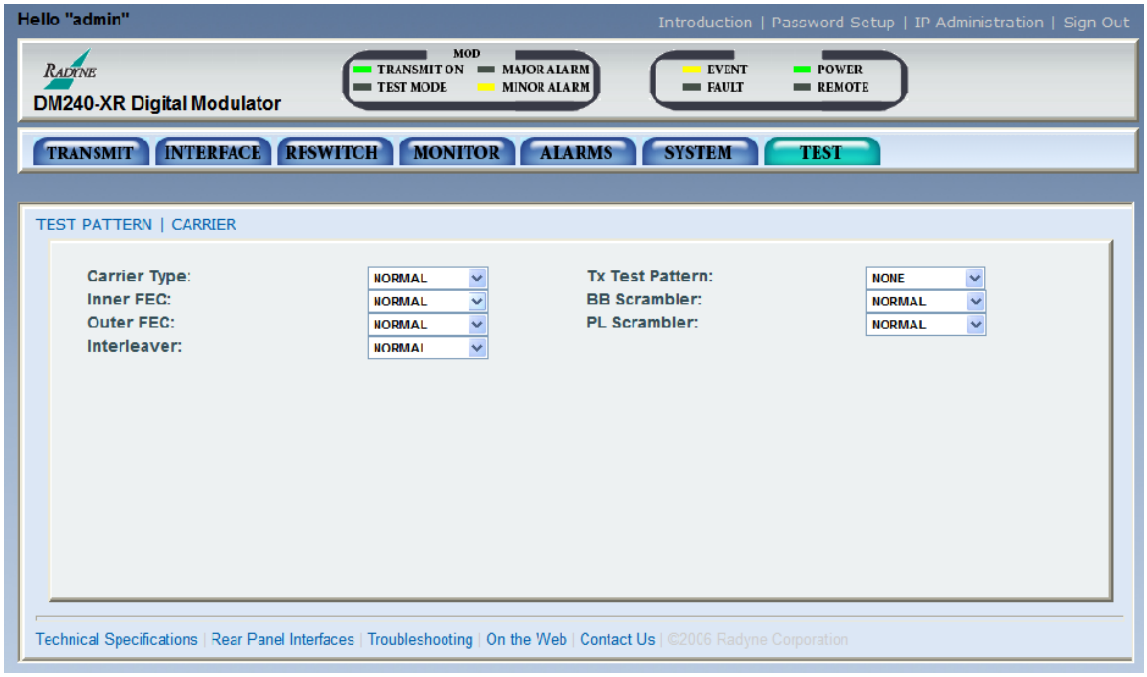



**Figure 10-22. Pattern/Carrier Menu**

# Appendix A. Front Panel Upgrade Procedure

## A.1 Introduction

The DM240XR Satellite Modulator offers the ability to perform field upgrades of the unit's feature set quickly and easily from the front panel. Purchased upgrades will become part of the modems permanent configuration. Demonstration upgrades will enable the optional features for a 30-day evaluation period. Front panel upgrades are supported by Firmware Version FO5377-L or greater.

## A.2 Required Equipment

The DM240XR is the only equipment required for this procedure.

## A.3 Upgrade Procedure

The following paragraphs describe the procedure for permanently updating the feature set of the Modulator.

1. The following steps allow users to quickly determine from the front panel whether or not the desired feature(s) are supported by the hardware currently installed in the modem.

a. From the modem's Main Menu, scroll right to the SYSTEM Menu.
b. Scroll down.
c. Scroll right to the HW/FW CONFIG Menu.
d. Scroll down
e. Scroll right to the FEATURES Menu.
f. Scroll down.
g. Scroll right to the UPGRADE LIST Menu.
h. Scroll down.
i. Scroll right through the available list of options.

The top line identifies the options and the second line identifies the following options status:

**INSTALLED** indicates that the option is already available as part of the modulator's feature set.

**HW & KEY REQ** indicates that additional hardware is required to support the option. Contact your Radyne sales representative for more information regarding the required hardware upgrade.

**KEY CODE REQ** indicates that the desired option is available as a front panel upgrade.

2. Contact Radyne with the Unit ID and Desired Upgrades. The modulator's Unit ID can be found on the front panel as follows:

a. From the modulator's Main Menu, scroll right to the SYSTEM Menu.
b. Scroll down.
c. Scroll right to the HW/FW CONFIG Menu.
d. Scroll down.
e. Scroll right to the FEATURES Menu.
f. Scroll down displays the feature code.

The value displayed on the top line of this menu is the 12-digit Unit ID. It is displayed as on the front panel of the modulator as 3 sets of 4 digits in a dot-delineated format as follows:

1 2 3 4 . 1 2 3 4 . 1 2 3 4

Your Radyne sales representative will ask you for this number along with your desired feature set upgrades when placing your order.

3. Once your order has been processed, you will be issued a 12-digit feature set upgrade code. This code is only good on the modem for which it was ordered. To enter this code from the front panel, perform the following:

a. From the modulator's Main Menu, scroll right to the SYSTEM Menu.
b. Scroll down.
c. Scroll right to the HW/FW CONFIG Menu.
d. Scroll down.
e. Scroll right to the FEATURES Menu.
f. Scroll down displays the feature code menu.

The value displayed on the top line of this menu is the 12-digit Unit ID. It is displayed on the front panel of the modem as 3 sets of 4 digits in a dot-delineated format indicated in Step 2. The second line is the data entry area and is displayed as 3 sets of 4 underscores in a dot-delineated format.

g. Press <ENTER>. A cursor will begin flashing in the data entry area.
h. Using the numeric keypad, enter your 12-digit upgrade code.
i. Press <ENTER>.

If the code entered is correct, the display will display **CODE ACCEPTED**, otherwise the **INVALID CODE** will be displayed.**.**

***Care should be taken to insure that the upgrade code is entered properly. After three unsuccessful attempts to enter a code, the front panel upgrade and demonstration capability will be locked out and it will be necessary to cycle power on the modem in order to continue.***

## A.4 Demonstration Procedure

The procedure for enabling a 30-day demo of the options is similar to the procedure used for permanently updating the modems feature set. The one big difference being that at the end of 30 days, the demo features will automatically be disabled and the modulator will revert back to its permanent configuration.

***At the end of the demonstration period, when the modulator reverts back to its permanent configuration an interrupt in traffic will occur, regardless of whether or not a demo enabled features was being run at the time. In addition, operator intervention may be required to restore the data paths. In order to avoid this interruption in service, the user can cancel the demonstration at any time by following the instructions outlined in the section on "Canceling Demonstration Mode."***

1. The following steps allow users to quickly determine from the front panel whether or not the desired feature(s) are supported by the hardware currently installed in the modulator.

   a. From the modulator's Main Menu, scroll right to the SYSTEM Menu.
   b. Scroll down.
   c. Scroll right to the HW/FW CONFIG Menu.
   d. Scroll down.
   e. Scroll right to the FEATURES Menu.
   f. Scroll down.
   g. Scroll right to the UPGRADE LIST Menu.
   h. Scroll down.
   i. Scroll right through the available list of options.

The top line identifies the options and the second line identifies the options status.

**INSTALLED** indicates that the option is already available as part of the modems feature set.

**HW & KEY REQ** indicates that additional hardware is required to support the option. Contact your Radyne sales representative for more information regarding the required hardware upgrade.

**KEY CODE REQ** indicates that the desired option can be enabled as a demonstration from the front panel.

2. Contact Radyne with the Unit ID and Request a Demonstration.

   The modulator's Unit ID can be found on the front panel as follows:

   a. From the modulator's Main Menu, scroll right to the SYSTEM Menu.
   b. Scroll down.
   c. Scroll right to the HW/FW CONFIG Menu.
   d. Scroll down.
   e. Scroll right to the FEATURES Menu.
   f. Scroll down.

The value displayed on the top line of this menu is the 12-digit Unit ID. It is displayed as on the front panel of the modem as 3 sets of 4 digits in a dot-delineated format as follows:

1 2 3 4 . 1 2 3 4 . 1 2 3 4

Your Radyne sales representative will ask you for this number along with the features you wish to demo.

3. Once your order has been processed, you will be issued a 12-digit demonstration code. This code can only be used one time and it is only good on the modulator's for which it was originally requested. To enter this code from the front panel, perform the following:

   a. From the modulator's Main Menu, scroll right to the SYSTEM Menu.
   b. Scroll down.
   c. Scroll right to the HW/FW CONFIG Menu.
   d. Scroll down.
   e. Scroll right to the FEATURES Menu.
   f. Scroll down.

   The value displayed on the top line of this menu is the 12-digit Unit ID. It is displayed on the front panel of the modem as 3 sets of 4 digits. The second line is the data entry area and is displayed as 3 sets of 4 underscores in a dot-delineated format.

Press <ENTER> and a cursor will begin flashing in the data entry area

Using the numeric keypad, enter your 12-digit demonstration code
Press <ENTER>.

If the code entered is correct, the display will display CODE ACCEPTED, otherwise the display will read INVALID CODE.

***Care should be taken to insure that the demonstration code is entered properly. After three unsuccessful attempts to enter a code, the front panel upgrade and demonstration capability will be locked out and it will be necessary to cycle power on the modem in order to continue.***

## A.4.1 Running in Demonstration Mode

Because of the possible interruption in traffic when the demonstration mode expires, several indicators are used to inform an operator that the modulator is indeed, operating in demonstration mode. The most obvious of these is that the remote LED is flashing.

A second indication can be found on the Features Menu as follows:

1. From the modulator's Main Menu, scroll right to the SYSTEM Menu.
2. Scroll down.
3. Scroll right to the HW/FW CONFIG Menu.
4. Scroll down.
5. Scroll right to the FEATURES Menu. The second line will display DEMO.

A third indication can be found in the upgrade list as follows:

1. From the FEATURES Menu.
2. Scroll down.
3. Scroll right to the UPGRADE LIST Menu.
4. Scroll down.
5. Scroll right through the available list of options.

The top line identifies the options and the second line identifies the options status.

**DEMO MODE** indicates that the option is has been temporarily activated and is now available for evaluation as part of the modulator's feature set.

At the end of the demonstration period, the modem will revert back to its permanent configuration. When it does, an interrupt in traffic will occur, regardless of whether or not a demo enabled features was being run at the time. In addition, operator intervention may be required to restore the data paths. In order to avoid this interruption in service, the user can cancel the demonstration at any time by following the instructions outlined in the section on Canceling Demonstration Mode.

## A.4.2 Canceling Demonstration Mode

At any time, a demonstration may be canceled and have the modulator return to its normal operation. Once the demonstration has been canceled, it cannot be restarted using the old demonstration code. In order to restart a demonstration, it will be necessary to obtain a new demonstration code.

To cancel a demonstration from the front panel, perform the following:

1. From the modulator's Main Menu, scroll right to the SYSTEM Menu.
2. Scroll down.
3. Scroll right to the HW/FW CONFIG Menu.
4. Scroll down.
5. Scroll right to the FEATURES Menu.
6. Scroll down.

The value displayed on the top line of this menu is the 12-digit Unit ID. It is displayed on the front panel of the modem as 3 sets of 4 digits in a dot-delineated format indicated in section 4.2. The second line is the data entry area and is displayed as 3 sets of 4 underscores in a dot-delineated format.

Press <ENTER> and a cursor will begin flashing in the data entry area

Using the numeric keypad, enter 0000 0000 0000

Press <ENTER>.

The modem will immediately terminate the demonstration and the feature set will revert back to the permanent configuration.

The Mod and Demod Test LED's will stop flashing.

# Appendix B. TCP/IP Ethernet Setup

## B.1 Introduction

The DM240XR supports SNMP, FTP protocols and the Web Browser. Utilization of the protocols is dependent upon proper set up of the TCP-IP menus. This document is to be used only as a guideline for setting up the TCP-IP menus. Contact the IT manager for proper guidance to ensure setup is successful. For additional information on the various WEB or SNMP configurations and descriptions refer to Section 8 and 10.

## B.2 TCP/IP Network Configuration

Using the Front Panel display and arrow keys, scroll thru the System menu until the TCP / IP sub menu is displayed. Each unit requires proper configuration with the correct network settings. Contact the IT manager for a valid IP address mask, Modem, server and router IP addresses.

Enter into the TCP / IP menu and the following Sub menus will appear, however the order may vary.

1. **Boot Mode**: This allows for the selection of the operating boot mode for the TCP / IP. Several selections are available and are described below. When configuring the modem for Web Browser, Boot Mode must be set to "NON-VOL". A brief description of the available selections are:

   a. **Default**: If the Ethernet interface is not to be used, select this mode. No IP Address or mask changes will be allowed while in this mode of operation. The following parameters will be set and will not change until the boot mode is changed. The IP addresses are non accessible addresses:

      - IP MASK 255.000.000.000
      - MODEM IP ADDR 010.000.000.001
      - SERVER IP ADDR 010.001.001.001
      - ROUTER IP ADDR 010.000.001.001

   b. **BOOTp**: When enabled, at boot time, the modem will use the Bootp Protocol to automatically get names, masks, and IP Addresses of the modem, router, and server from the Network Manager. This should be consistent with the tag expected by the users Bootp Server (see the next menu selection for setting the BOOTp TAG). If Bootp is not enabled, the modem will ignore the BOOTp Tag setting.

c. **NON-VOL**: This will allow for setting up all required IP Addresses and will store the information to the non-volatile memory. Upon power cycle, the modem will restore the saved settings into the correct fields.

d. **IP TEST**: The IP Test selection is similar in behavior to the Default selection. When enabled, the following preset parameters will be programmed and will not change until the selection is changed. To edit these parameters, change the boot mode to NON-VOL.

- IP MASK 255.255.255.000
- MODEM IP ADDR 192.168.000.238
- SERVER IP ADDR 192.168.000.101
- ROUTER IP ADDR 192.168.000.102

***The DM240XR is shipped from the factory with the Boot Mode configured as Default. Verify that the Boot Mode is set for Default. To access the unit via the Ethernet port, set the selection to IP TEST. This will set the IP parameter to an accessible address. If user wants to utilize an alternate address, user must set the selection to NON-VOL. As an example, we will use a new modem IP address of 172.018.100.205 for the remaining of the TCP-IP setup procedure. Contact the IT manager for proper guidance to ensure setup is successful.***

2. **BOOT SERVER TAG**: This allows for the selection of the operating boot tag when operating in the BOOTp Mode. The default setting of 206 is automatically selected when the boot mode is set to 'DEFAULT' (factory preset mode).

3. **MODEM HOST**: This displays the unit Host name that is operating, such as "DM240". This is a read only display.

4. **IP ADDR MASK**: This will allow for the entry of the IP Address Mask. This will need to be entered based on the Network settings. Refer to your IP Administrator if you do not know this address for the correct address setting. Example IP Address Mask setting: 255.255.000.000.

5. **MODEM IP ADDR**: This will allow for the entry of the Modem's individual network IP Address. Each device on the network will have a unique address. Refer to the IT administrator for the correct address setting. Example Modem IP Address setting: 172.018.100.215.

6. **SERVER IP ADDR**: This allows for the setup of the Network Server IP Address. This section refers to the Host that will be used to optionally boot the DM240 on power-up and is the SNMP Trap Server. This IP Address needs to be consistent with the Modem IP Address. Broadcast and loop back addresses will not be allowed. Example Server IP Address setting: 172.018.004.250.

7. **ROUTER IP ADDR**: This allows for the setup of the Network Router IP Address. If a router is present on the local network, and it is to be used, this address must be consistent with the IP Address Mask and the subnet of the modem. If no router is present, then the address should be

set to a foreign address. Broadcast and loop back addresses will not be allowed. Router not used example: Router IP Address setting: 010.000.001.001.

8. **MODEM EADDR**: This displays the Modem (Unit) Ethernet Address. The Modem Ethernet Address is configured at the factory. It is a unique Radyne equipment identifier Address. Example: 0010650903EB

9. **ETHER RATE**: This displays the current Ethernet port data rate. If multiple rates are available, then a selection can be made to specify the Ethernet port data rate (10BaseT). Example Ethernet port Data Rate: 10 MBPS/HD

## B.3 Network Configuration Summary

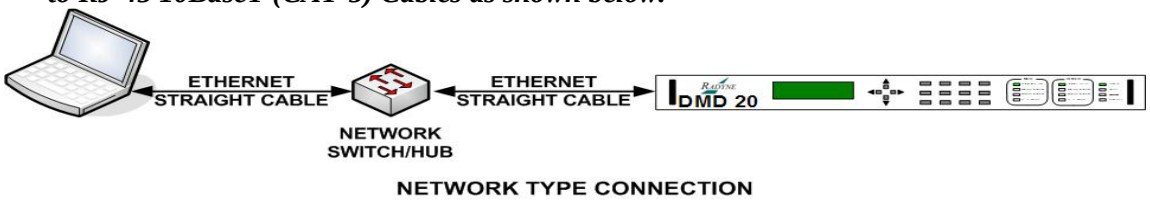
If the above steps were followed and the information was entered, then the following would be the TCP / IP configuration summary for a 'no router specified' setup:

1. Boot Mode = NON-VOL
2. Bootp Server Tag = 206
3. Modem Host= DM240
4. IP Address Mask = 255.255.0.0
5. Modem IP Address = 172.18.100.215
6. Server IP Address = 172.18.4.250
7. Router IP Address = 010.000.001.001
8. Modem Ethernet Address= 0010650903EB
9. Ethernet Rate = 10 MBPS/HD

## B.4 Ethernet Test

### B.4.1 Connecting the Modem Ethernet Cable to a Network Link

***1. Connect the Network Switch (Hub) to the Modem Ethernet port (J9) using standard RJ-45 to RJ-45 10BaseT (CAT-5) Cables as shown below.***

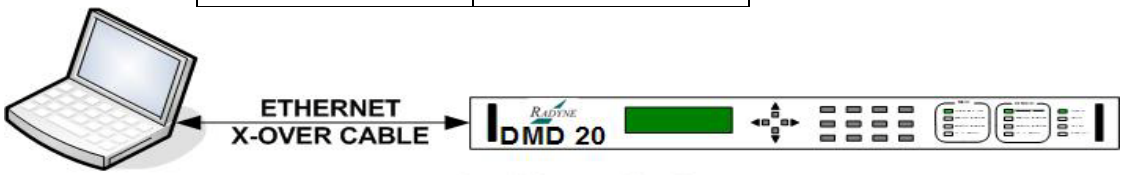



**DM240 Ethernet Network Connection**

### B.4.2 Connecting the Modem Ethernet Cable Directly to a Computer (without a Network)

The user can directly connect to the equipment without connecting to a network. This will often occur at remote sites where a network is not available. To connect, the user will need an Ethernet Crossover (Null) cable. The pinout for this cable is as follows,

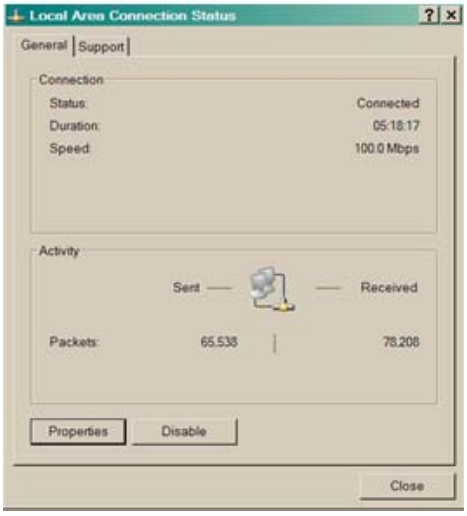
| RJ45 Connector A | RJ45 Connector B |
|---|---|
| Pin #1 | Pin #3 |
| Pin #2 | Pin #6 |
| Pin #3 | Pin #1 |
| Pin #4 | Pin #4 |
| Pin #5 | Pin #5 |
| Pin #6 | Pin #2 |
| Pin #7 | Pin #7 |
| Pin #8 | Pin #8 |




**DIRECT CONNECTION**

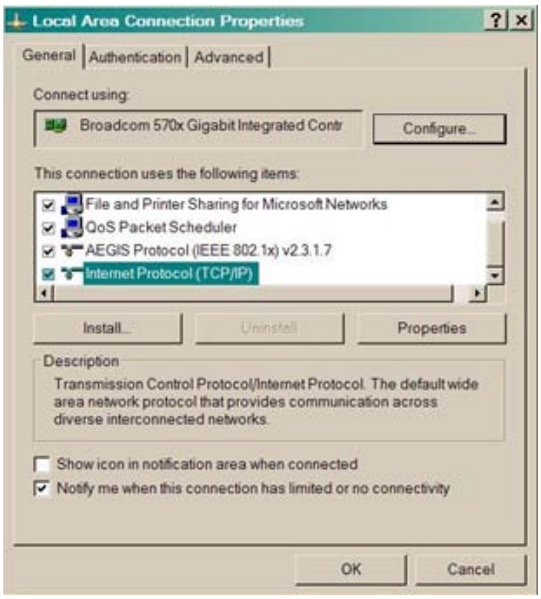
The Computer TCP/IP must be properly configured in order to obtain connectivity. The following set-up procedure can be used as a guide to aide in this setup. The following instructions apply only to Windows 2000 or XP Classic.

1. Click on the Start Button. Select Settings and click on the Control Panel Icon. Double click the Network Connections Icon.
2. Select the Local Area Connection icon for the applicable Ethernet adapter. Usually it is the first Local Area Connection listed. Double click the Local Area Connection. Click on the Properties icon.



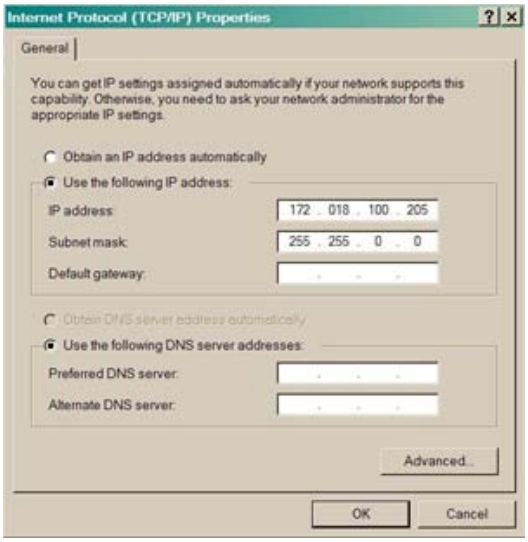

**Local Area Connection Status Box**

3. Make sure that the box next to the Internet Protocol (TCP/IP) is checked. Highlight Interconnect Protocol (TCP/IP) and click on the Properties button.




**Local Area Connection Properties Box**

4. Select "Use the following IP Address". Enter in the IP Address that is offset by 5 or so numbers from the equipment address (the computer and the equipment that it is connecting to can not have identical addresses) and Subnet Mask ( this is identical to the subnet mask programmed into the equipment) into the corresponding fields. Click the OK button to complete the PC Configuration. Note: some computers may require that the computer be restarted for the changes to take effect.


Internet Protocol (TCP/IP) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address:
172 . 018 . 100 . 205
Subnet mask:
255 . 255 . 0 . 0
Default gateway:
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Advanced...
OK
Cancel

**Internet Protocol (TCP/IP) Properties Box**

5. To reconnect the computer to a network, select the "Obtain an IP address automatically" selection in the screen shown above.

## B.4.3 Testing the Ethernet connection using the Ping Program (Optional)

To verify that connectivity and settings are correct, use the Ping command to report if the Host (Equipment) is correctly responding. This is accomplished by opening the MS-DOS Command Prompt and executing a Ping command as shown in the following example.

1. Open MS-DOS Command Prompt. The Screen will display:

   Microsoft Windows XP [Version 5.1.2600]
   (C) Copyright 1985-2001 Microsoft Corp.

2. At the Command Prompt Enter "ping 172.18.100.215" (Enter the IP Address of the equipment to be tested). The screen will display:

   Microsoft Windows XP [Version 5.1.2600]
   (C) Copyright 1985-2001 Microsoft Corp.

   C:\> ping 172.18.100.215

3. If the ping is successful the screen will display:

   C:\>ping 172.18.100.215

   Pinging 172.18.100.215 with 32 bytes of data:

   Reply from 172.18.100.215: bytes=32 time=109ms TTL=64
   Reply from 172.18.100.215: bytes=32 time<1ms TTL=64
   Reply from 172.18.100.215: bytes=32 time=2ms TTL=64
   Reply from 172.18.100.215: bytes=32 time=123ms TTL=64

   Ping statistics for 172.18.100.215:
   Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
   Approximate round trip times in milli-seconds:
   Minimum = 0ms, Maximum = 123ms, Average = 58ms

4. If the ping is unsuccessful the screen will display:

   C:\>ping 172.18.100.215

   Pinging 172.18.100.215 with 32 bytes of data:

   Request timed out.
   Request timed out.
   Request timed out.
   Request timed out.

   Ping statistics for 172.18.100.215:
   Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

   *Check the following items that may lead to the unsuccessful response:*

   a. Verify that the correct cables are connected to the Ethernet port and that they are secured.

b. The Link Light is illuminated.
c. The IP Address that is used matches the Modem's IP Address.
d. The Server and Modem are on the same subnet.

**Notes:**

# Appendix C. Web Browser Quick Setup Guide

## C.1 Introduction

The DM240XR Web Browser allows for connection to Radyne products through the Ethernet port. The Web interface allows for complete control and monitoring of all equipment parameters and functions via a 10Base-T Ethernet connection. Utilization of the Web browser is dependent upon proper set-up of the TCP-IP menus. For TCP-IP setup guidelines refer to Appendix G in the manual. For additional information on the various WEB configurations and descriptions refer to the Section 10.

To verify that the Radyne product is configured with the Web interface, use the products front panel <SYSTEM> control screen and verify that the WEB sub menu is visible. Contact the Radyne Customer Service Department if the WEB feature is not displayed on the front panel to identify the product is upgradeable.

***Utilization of the Web Browser requires proper setup of the TCP-IP menus. The unit is shipped from the factory with the Boot Mode configured as Default. Verify that the Boot Mode is set for Default. To access the unit via the Ethernet port, set the Boot Mode to IP TEST. This will set the IP parameter to an accessible address. If user wants to utilize an alternate address, user must set the Boot Mode to NON-VOL. Contact the IT manager for proper guidance to ensure setup is successful.***

## C.2 Web Users Configuration

Radyne utilizes authentication and authorization together with a user database and a security Realm to design a secure site. This allows for the use of users and groups, where users are generally people that may access the system, and groups represent the position that users can hold.

The Modem's Front Panel has full administrative privileges, allowing the operator through the Front Panel Menu entries to perform monitor and control modem parameter settings, change other interface user names and passwords, and modify IP network settings.

The web user database consists of three users (USER 1, USER 2, USER 3), with initial default names of guest, oper, and admin. Access rights and authentication make it possible to restrict access to a specified set of web users. There are three levels of security privileges that can be assigned to any user. They are:

- GUEST: Users are able to navigate most of the site, and view modem parameter settings.
- OPER: Users can monitor and control modem parameter settings, and change their own authentication passwords.
- ADMIN: At this highest access right, users can monitor and control modem parameter settings, change any user's name and authentication password, and modify IP network settings. This setting has full access to the entire site.
- NO GROUP: Assigning this will block all access from the site.

Listed in the table below are the factory default user names and corresponding default passwords and settings:

| USER ID | Access Group | Authentication Password | Web User |
|---|---|---|---|
| USER 1 | GUEST | guest | guest |
| USER 2 | OPER | oper | oper |
| USER 3 | ADMIN | admin | admin |

***All entries are case sensitive.***

Using the Front Panel display and arrow keys, scroll thru the System menu until the WEB sub menu is displayed. Enter into the WEB menu and the following Sub menus will appear (order may vary).

1. **CONFIRMATION**: When ENABLED, a change in the Web Interface will prompt a secondary window to be displayed asking "Do you want to proceed". This will allow the user to either OK the change or cancel the change. When this feature is DISABLED, the command will be executed upon entering the command or parameter change. Commands pertaining to frequency

and data rates cannot be overridden. The Confirmation command is located under PASSWORD SETUP/PREFERENCES.

2. **USER 1**: This will allow the operator to change the user name, assign the Access group, authorized password for "USER 1". Upon entering the following fields will be displayed:

    a. **ACCESS GROUP:** This will allow the assignment of "No Group", "ADMIN", "OPER", or GUEST to USER 1.
    b. **AUTH PASSWORD:** This will allow for the entry of the password for USER 1.
    c. **USER RESET:** Using this command will allow the factory defaults (as listed in the table above) to be restored to USER 1. This can be used in the event that USER 1 is locked out due to password restriction.

3. **USER 2**: This has the same menu structure as USER 1.

4. **USER 3**: This has the same menu structure as USER 1.

Radyne's Web configuration allows for the support of 3 user profiles. These are configured through the 'PASSWORD/SETUP ACCESS section in the Web Browser.

## C.2.1 Change Web User Name

Any of the three available user names can be modified.

1. Go to <USERx> Submenu, press <ENTER> then move the cursor to any position and press <CLEAR> along with the 'Right Arrow' key to clear all text to the right of the cursor.
2. Use the arrow keys and the numerical keypad to set the desired user name. Press <ENTER> to accept the changes.

## C.2.2 Change Authentication Password

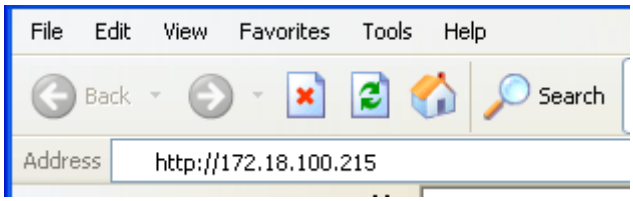
1. Go to <USERx> Submenu, press 'Down Arrow' to access its corresponding lower level sub-menus.
2. Go to <AUTH PASSWORD> Submenu, <ENTER> then move the cursor to any position and press <CLEAR> along with the 'Right Arrow' key to clear all text to the right of the cursor.
3. Use the arrow keys and the numerical keypad to set the desired password. Press <ENTER> to accept the changes.

### C.2.3 Change Access Rights

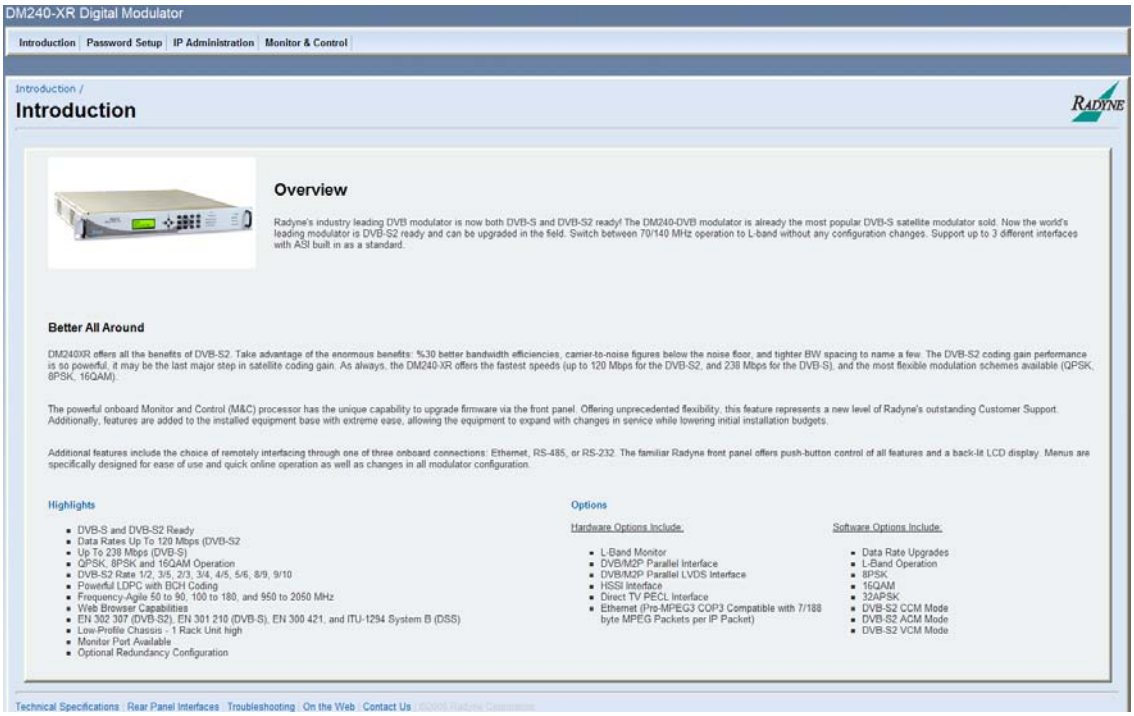
1. Go to <USERx> Submenu, press 'Down Arrow' to access its corresponding lower level sub-menus.
2. Go to <ACCESS GROUP> Submenu, <ENTER> then move the cursor to any position and press <CLEAR> along with the 'Right Arrow' key to clear all text to the right of the cursor.

## C.3 Modem Web Site

Once it is determined that the modem is reachable, start the internet browser and type the modem IP address in the address field then press the Enter key.

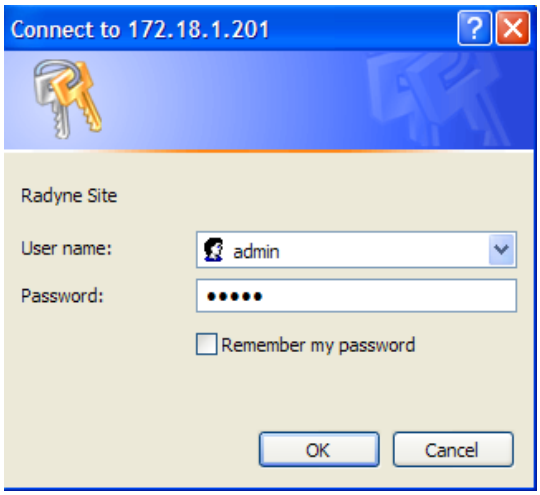



The equipment Introduction page will display general information, showing the equipment type, an overview of the equipment features and capabilities, and available hardware and software options. Complete technical specifications, and product options are also available in a PDF format at the bottom of the screen. Links to the Radyne Corporation website and Customer service is also accessible provided access to the internet is available.


DM240-XR Digital Modulator
Introduction
Password Setup
IP Administration
Monitor & Control
Introduction /
Introduction
RADYNE
Overview
Radyne's industry leading DVB modulator is now both DVB-S and DVB-S2 ready! The DM240-DVB modulator is already the most popular DVB-S satellite modulator sold. Now the world's leading modulator is DVB-S2 ready and can be upgraded in the field. Switch between 70/140 MHz operation to L-band without any configuration changes. Support up to 3 different interfaces with ASI built in as a standard.
Better All Around
DM240XR offers all the benefits of DVB-S2. Take advantage of the enormous benefits: %30 better bandwidth efficiencies, carrier-to-noise figures below the noise floor, and tighter BW spacing to name a few. The DVB-S2 coding gain performance is so powerful, it may be the last major step in satellite coding gain. As always, the DM240-XR offers the fastest speeds (up to 120 Mbps for the DVB-S2, and 238 Mbps for the DVB-S), and the most flexible modulation schemes available (QPSK, 8PSK, 16QAM).
The powerful onboard Monitor and Control (M&C) processor has the unique capability to upgrade firmware via the front panel. Offering unprecedented flexibility, this feature represents a new level of Radyne's outstanding Customer Support. Additionally, features are added to the installed equipment base with extreme ease, allowing the equipment to expand with changes in service while lowering initial installation budgets.
Additional features include the choice of remotely interfacing through one of three onboard connections: Ethernet, RS-485, or RS-232. The familiar Radyne front panel offers push-button control of all features and a back-lit LCD display. Menus are specifically designed for ease of use and quick online operation as well as changes in all modulator configuration.
Highlights
DVB-S and DVB-S2 Ready
Data Rates Up To 120 Mbps (DVB-S2
Up To 238 Mbps (DVB-S)
QPSK, 8PSK and 16QAM Operation
DVB-S2 Rate 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10
Powerful LDPC with BCH Coding
Frequency-Agile 50 to 90, 100 to 180, and 950 to 2050 MHz
Web Browser Capabilities
EN 302 307 (DVB-S2), EN 301 210 (DVB-S), EN 300 421, and ITU-1294 System B (DSS)
Low-Profile Chassis - 1 Rack Unit high
Monitor Port Available
Optional Redundancy Configuration
Options
Hardware Options Include:
L-Band Monitor
DVB/M2P Parallel Interface
DVB/M2P Parallel LVDS Interface
HSSI Interface
Direct TV PECL Interface
Ethernet (Pro-MPEG3 COP3 Compatible with 7/188 byte MPEG Packets per IP Packet)
Software Options Include:
Data Rate Upgrades
L-Band Operation
8PSK
16QAM
32APSK
DVB-S2 CCM Mode
DVB-S2 ACM Mode
DVB-S2 VCM Mode
Technical Specifications
Rear Panel Interfaces
Troubleshooting
On the Web
Contact Us

**DM240XR Web Browser Introduction Page**

To navigate to other parts of the site, the modem needs to know who the user is to allow assignment of the proper level of transactions and resources. This authentication is done through the use of a username and password. The following screen will pop-up as soon as entry is requested into any other web pages (i.e. Password Set-up, IP Administration, and Monitor and Control). The factory default User Name and password defaults are listed above.
Enter "admin" for the user name and "admin" for the password to gain access with full privileges to the other pages within the browser.

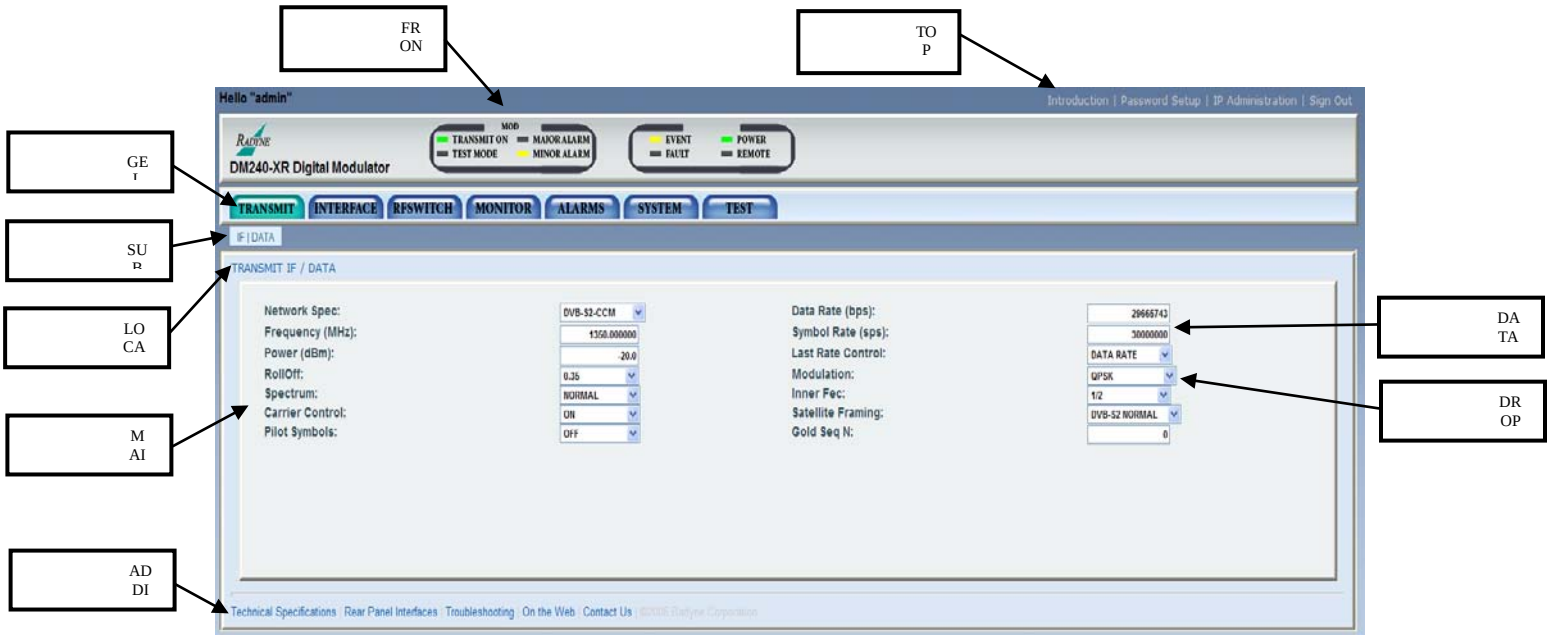



**DM24XR Login Window**

Upon completion of a successful login, the user will be able to access the other screens within the Web Browser.

## C.4 Web Page Appearance

This page displays the Monitor and Control section of the DM240XR Web Interface. With a front panel look and feel, and an appearance that resembles the DM240XR layout.




**DM240XR Monitor and Control Web Page**

The top of the web page displays an alarm section reflecting the current front panel status of the modem. This block will be updated immediately whenever status is changed.

The navigation scheme consists of gel tabs that correspond to the front panel top-level menu selections. When the mouse is dragged over a tab, it gets highlighted with a rollover effect and a sub-level of selections is revealed. These correspond to the front panel sub-menus.

Below the menu gel tabs, the main menu section will reflect the current programmed control state. At the top of the page, breadcrumb location identifier reminds the user how the page is selected (Location Identifier).

There is a simple navigation scheme that consists of gel tabs centralized on the main page.

# Appendix D. AutoEQ™ Interface Operation Guide

## D.1 Introduction

Appendix C outlines the operation and configuration of the AutoEQ™ PIIC Interface. The AutoEQ™ Interface is used in conjunction with the DM240XR.

## D.2 Applicable Documents

The following documents can be used for reference in aligning and troubleshooting the AutoEQ system. Insure that the document revision is the same as the hardware revision of the assembly.

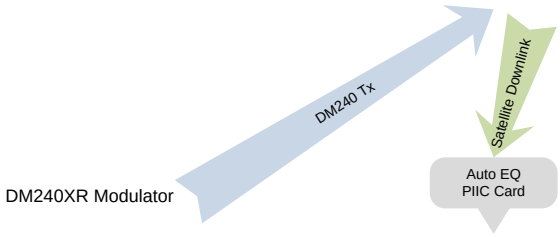
- AN208: DM240XR Firmware Upgrade Procedure

## D.3 AutoEQ™ PIIC Interface Theory of Operation

AutoEQ™ PIIC Interface allows the ability to compensate for the overall system Group Delay and Amplitude Equalization over the satellite by pre-distorting the Uplink Carrier, eliminating the need for external Group Delay/Amplitude Equalizers. AutoEQ™ will automatically generate the proprietary profile for the DM240XR to pre-distort the modulator, resulting in Amplitude and Group Delay equalization over the Satellite Link.

**Figure 1. Auto EQ PIIC Card Usage**

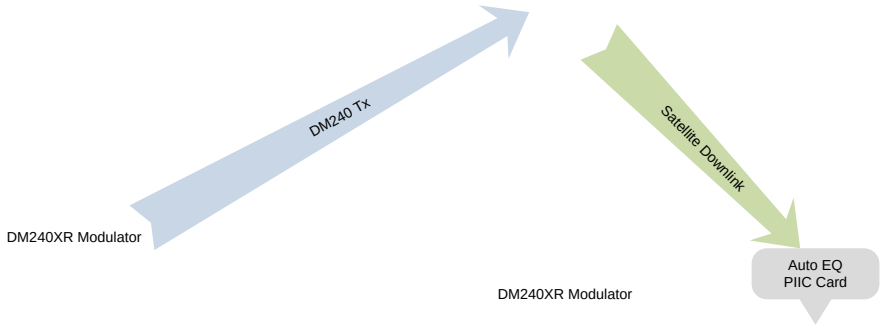
Auto EQ where the Uplink Modulator is in the same footprint of the Downlink and can demodulate itself.




Hardware Required:
(1) DM240XR
(1) AutoEQ Card (ie. PLR5972)

Software Required:
(1) SS-DM240XR-34 Auto EQ Executable
(1) SS-DM240XR-36 Auto EQ Remote Server (Not Used)

Auto EQ where the Uplink Modulator can not see the Downlink due to cross-strap beam etc.




Hardware Required:
(1) DM240XR

Software Required:
(1) SS-DM240XR-34 Auto EQ Executable
(1) SS-DM240XR-36 Auto EQ Remote Server (Is Used)

Hardware Required:
(1) DM240XR
(1) AutoEQ Card (ie. PLR5972)

Software Required:
(1) SS-DM240XR-15 Auto EQ Remote Client

AutoEQ™ supports SCPC equalization of Group Delay and Amplitude over the satellite system. When installed into the PIIC slot of the DM240XR (with Firmware Revision FO5377-J or higher), the AutoEQ™ Calibration menu will be displayed allowing for selection and monitoring of the AutoEQ™ functions. The AutoEQ™ will operate over the full transponder from a symbol rate of 10.1 Msps to 45 Msps.

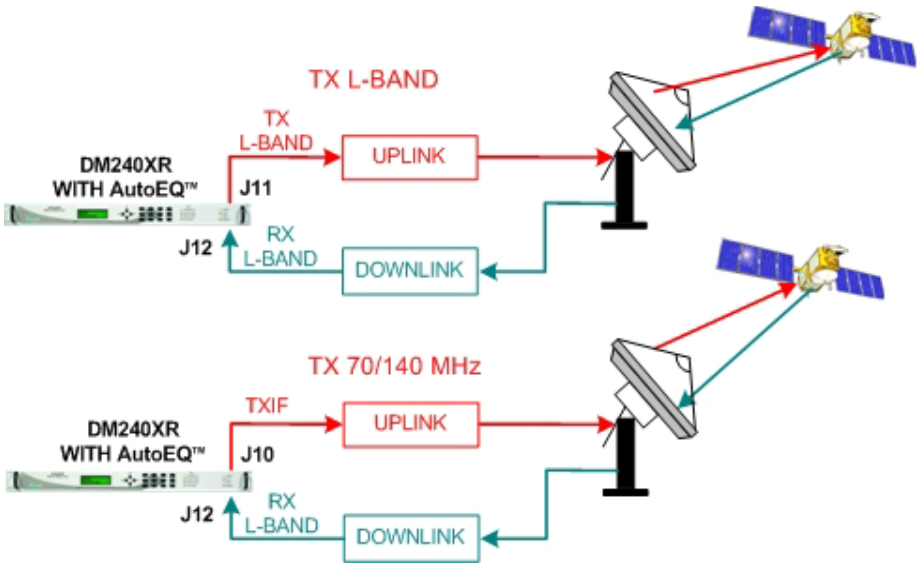
Note, the 45 Msps AutoEQ™ requires a different PIIC card (PLR5972) than the original PIIC card (PLR5808) operating to 38 Msps. The new AutoEQ™ card supersedes and replaces the original one and both are supported by revision N or later firmware.

When the AutoEQ™ Calibration mode is selected, the DM240XR will disable the existing programmed modulated outbound signal, and replace it with the AutoEQ™ calibration signal at the same Symbol Rate, Roll off, and Transmit frequency as programmed into the DM240XR. This signal is transmitted to the satellite, and received (Satellite Loop-Back) by the DM240XR AutoEQ™ input at the L-Band downlink frequency. The AutoEQ™ calibration mode will demodulate the received signal, and automatically calculate the required pre-distortion parameters for the Satellite Link.

This information is read by the DM240XR modulator where the new pre-distort values are programmed into the outbound carrier, resulting with the required pre-distortion of the TX output. Upon successful completion of the calibration cycles, the DM240XR will automatically return to the programmed outbound signal (such as DVB-S2) with the proper pre-distortion for the satellite loop per the selected symbol rate, roll off and transponder frequency. If any parameters are changed affecting Symbol Rate or Roll off, AutoEQ™ must be re-calibrated to the new parameters. At any time, AutoEQ™ can be enabled or disabled.

The DM240XR is capable of retaining 32 AutoEQ™ satellite loop pre-distortion values, which can be useful for systems requiring relocation to different transponders or Satellites. Once the applicable transponder is calibrated, the calibration information can be stored in memory for use now or in the future. All storage locations can be renamed by the user to correspond with the identification of the transponder, and recalled for operational use.

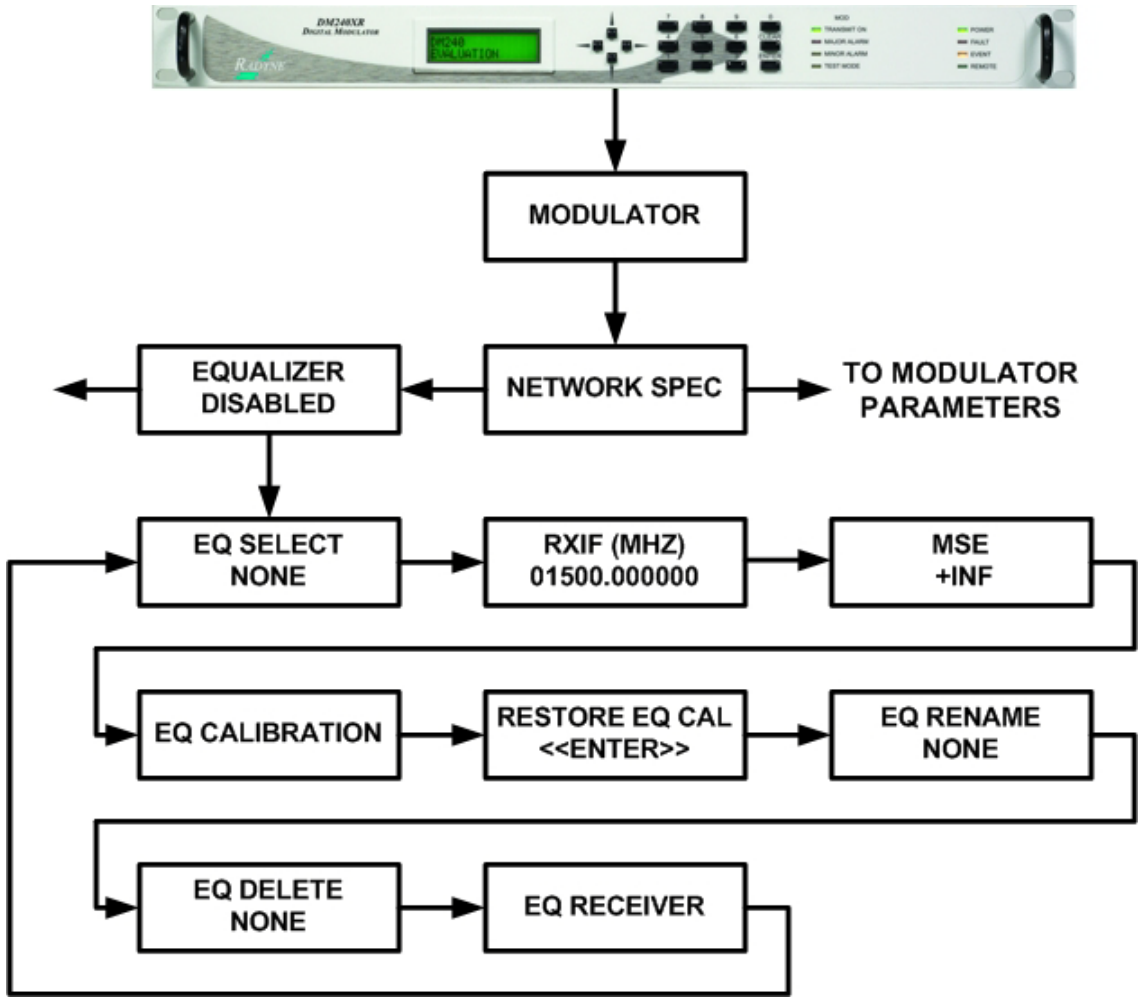
**Figure 2 AutoEQ™ Satellite Loopback**



## D.4 AutoEQ™ Menu Options and Parameters

These Menu options are only available when the DM240XR is configured for AutoEQ™ operation. Refer to Figure 3 for the AutoEQ™ portion of the DM240XR Menu Tree. The DM240XR must have software Version FO5377-J or higher to operate the AutoEQ™ PIIC Interface Card. These Menu options are also available on the Ethernet Web browser (J6), the RS232 (J1) terminal port, and the Remote Port (J4) of the DM240XR. Refer to the DM240XR Manual for all Modulator related options and Parameters.

**Figure 3 AutoEQ™ Menu Tree**



**EQ ENABLE:** **{Enable, Disable}**
Allows the DM240XR Modulator to implement the AutoEQ™ coefficient values as specified by the EQ Select.

**EQ SELECT:** **{None, User Specified Name}**
Allows the DM240XR Modulator to select the stored AutoEQ™ coefficient file to be implemented. Up to 32 User Nameable storage locations are available.

**RXIF:** **{950 – 2050 MHz}**
Sets the receive input center frequency for the AutoEQ™ Interface Card. This programmed frequency must be within ± 25 kHz of the actual desired system downlink center frequency to insure proper acquisition.

**MSE:** **{Value}**
Displays the Mean Squared Error (MSE) value of the equalizer. A value of 1 E-5 or less indicates a successful calibration run with acceptable coefficients for operation over the satellite.

**EQ CAL:** **{Normal, Calibrating, Ref ACQ}**
Allows the DM240XR Modulator to select the AutoEQ™ interface mode of operation.

**Normal:** When in this state, the AutoEQ™ is in monitoring mode, with no Calibration or Reference Acquisition functions being preformed.

**Calibrating:** When in this state, the AutoEQ™ will program the DM240XR modulated output for the AutoEQ™ calibration signal. The calibration output bandwidth is set by the symbol rate currently programmed into the DM240XR Modulator. During calibration, the AutoEQ™ will compute the coefficient values required to successful equalize the group delay and amplitude of the satellite link over the programmed symbol rate. During this process, the MSE can be monitored reflecting the calibration process. Upon successful completion of the calibration, the EQ CAL will revert to the “Normal” state, and the event log of the DM240XR will reflect “AutoEQ™ CAL SUCCESSFUL”.

(**EQ CAL: Cont)**

**REF ACQ:** Although default reference files are provided, the operator may wish to acquire the best possible reference from their modulator. A mechanism to accomplish this is allowed by REF ACQ, this overwrites the stored default and replaces it with a new reference. Prior to entering this state, the L-Band output of the DM240XR (J11) must be connected to the AutoEQ™ RXRF Input (J12). The DM240XR Output power should be set to -20 dBm, and a 20 dB in line attenuator should be used. The Modulator output frequency should be set to set to the corresponding AutoEQ™ RXRF Input Frequency. When properly connected and in this state, the AutoEQ™ will program the DM240XR modulated output for the AutoEQ™ calibration signal. The calibration output bandwidth is set by the symbol rate currently programmed into the DM240XR Modulator. During reference calibration, the AutoEQ™ will obtain receive lock and establish the baseline coefficients for internal reference. References are captured for each modulator roll-off and oversample rate. During this process, the MSE can be monitored reflecting the Reference Acquisition process. Upon successful completion of the Reference Acquisition, the REF ACQ will revert to the "Normal" state, and the event log of the DM240XR will reflect "REF ACQ SUCCESSFUL".

**RESTORE EQ CAL:** **{Filename}**
Allows the selected Calibration coefficient file to be Restored.

**EQ RENAME:** **{Filename}**
Allows the Calibration coefficient file to be renamed using Alpha-numeric characters.

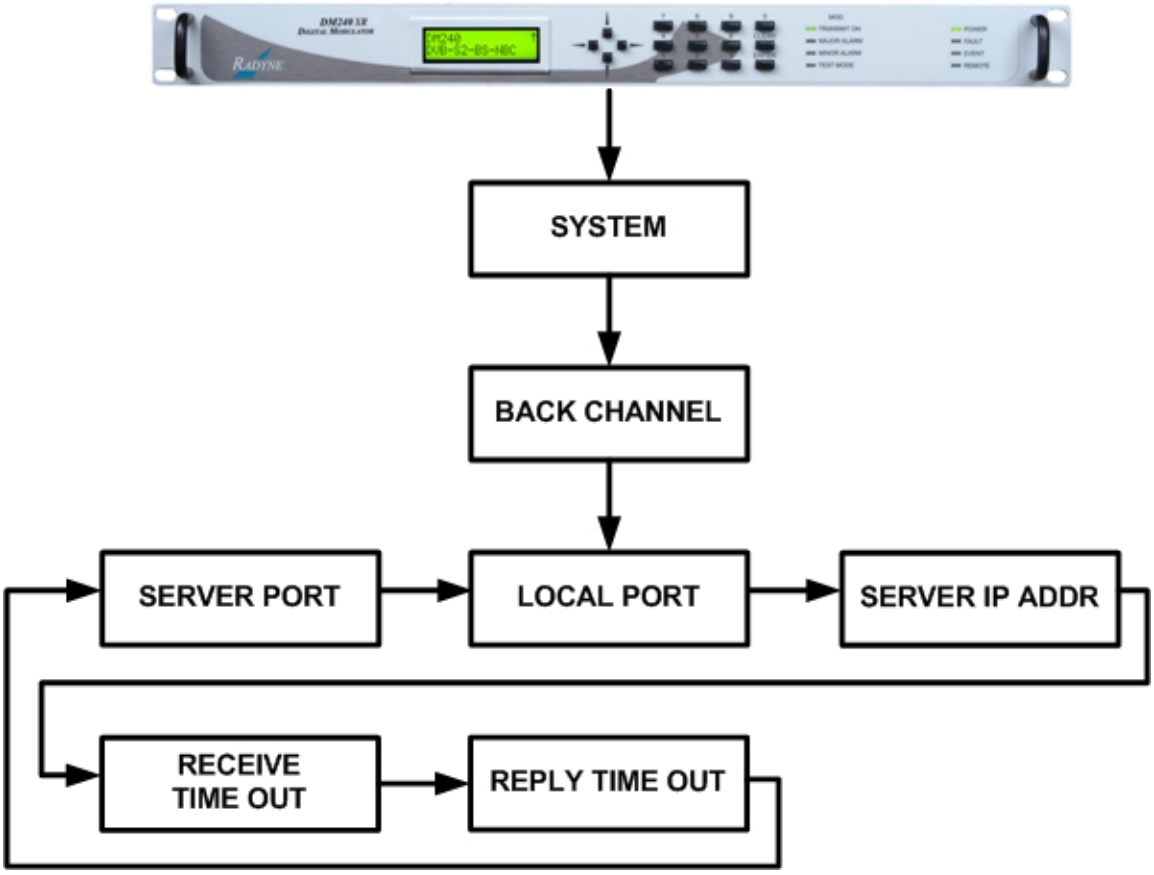
**EQ DELETE:** **{Filename}**
Allows the selected Calibration coefficient file to be deleted.

**EQ RECEIVER:** **{Local, Remote}**
Allows selection of Local or Remote Equalization.

## D.5 AutoEQ™ Back Channel Menu Options and Parameters

These Menu options are only available when the DM240XR is configured for AutoEQ™ operation. Refer to Figure 4 for the back channel portion of the DM240XR Menu Tree. The DM240XR must have software Version FO5377-J or higher to operate the AutoEQ™ PIIC Interface Card. These Menu options are also available on the Ethernet Web browser (J6), the RS232 (J1) terminal port, and the Remote Port (J4) of the DM240XR. Refer to the DM240XR Manual for all Modulator related options and Parameters.

**Figure 4. AutoEQ™ Back Channel Menu Tree**



## D.6 AutoEQ Backchannel Setup

**Introduction**

To support remote equalization with the AutoEQ system, the equalization data is transported over TCP/IP using a backchannel protocol. Before setting up the backchannel, perform the TCP/IP Ethernet setup as outlined in the TCP/IP Ethernet Setup section of the user manual. This document is to be used only as a guideline for setting up the backchannel menus. Contact the Network administrator for proper guidance and support to ensure setup is successful.

**Backchannel Configuration**

Using the Front Panel display and arrow keys, scroll thru the System menu until the Backchannel sub menu is displayed. Both the local unit (the Modulator) and the remote unit (with the AutoEQ card installed) require the proper configuration with the correct network settings.
Refer to Figure 4.

***Note: The router/gateway/firewall system must be configured to allow these ports to pass on each communication end. Contact your Network Administrator for allowable port numbers and to open up the ports on the firewall if necessary.***

Enter into the Backchannel menu and the following sub menus will appear, however the order may vary.

**LOCAL PORT:** **{XXXX}**
The local port number must be set to the same value at both the local and remote sites.

**SERVER PORT:** **{XXXX}**
The server port number must be set to the same value at both the local and remote sites.

***Note: The local port and server port values must be different from the local and remote sites.***

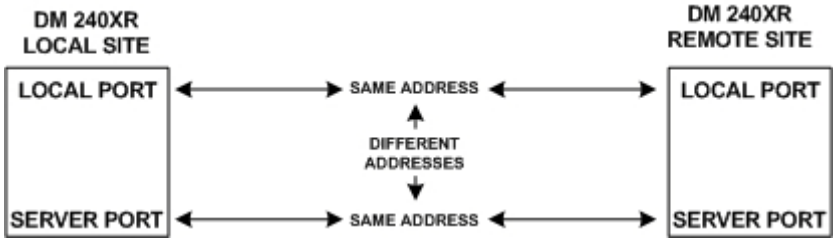
**SERVER IP ADDR:** **{XXX.XXX.XXX.XXX} Hexidecimal Address**
**{ddd.ddd.ddd.ddd} Decimal Address**
On the local unit, this should have the value of the remote unit's IP address.

***Note: If the remote IP address is not publicly accessible then its translated NAT (Network Address Translation) needs to be applied.***

**RECEIVE TIMEOUT:** **{X.X MINUTES}**
This value is factory set, and should only be adjusted as directed by your Network administrator or Radyne Customer Service.

**REPLY TIMEOUT:** **{XX secs}**
This value is factory set, and should only be adjusted as directed by your Network administrator or Radyne Customer Service.

**Figure 5. AutoEQ™ Backchannel Setup**




**Back Channel Test**

The "BACK CHAN TEST" does the following:

1. Establishes a connection with the back channel server as defined under the SYSTEM->BACK CHANNEL menu.
2. Issues a ping to the back channel server.
3. Sends a message to and validates the reply from the back channel server application running on the back channel server.
4. If passes, no additional; events will appear in the event log.
5. If fails, logs one of the following events on the local side event log:
    a. "BACK CHANNEL TEST: FAILED PING"
    b. "BACK CHANNEL TEST: FAILED BACK CHAN SERVICE REQ"
    c. "BACK CHANNEL TEST: REPLY FORMAT ERROR"
    d. "BACK CHANNEL TEST: ERROR REPLY"
6. If fails, may log one of the following events on the server side event log:
    a. "INVALID CHANNEL TEST SIZE"
    b. "INVALID CHANNEL TEST PAYLOAD"

**Ethernet Test**

**Verify Local Router:**
On the local unit, using the Front Panel display and arrow keys, scroll thru the Monitor menu and clear the Event Log.

Now scroll thru the Test menu and Ping Test the TCP/IP ROUTER. If the event LED on the front panel does not light, communications between the modem and its router was successful.

**Verify Remote Router:**
Perform the same test on the remote unit as detailed under Verify Local Router.

**Verify Local to Remote Connection:**
On the local unit, using the Front Panel display and arrow keys, scroll thru the Monitor menu and clear the Event Log.

Now scroll thru the Test menu and Ping Test the BK CHAN SERVER. If the event LED on the front panel does not light, communications between the local modem and the remote modem was successful.

## D.7 AutoEQ™ Operation Procedure

The following sequence must be followed in order to perform the initial AutoEQ™ Calibration. The sequence is identified into three (3) individual sections: 1) Reference Acquisition Calibration (REF ACQ) - optional, 2) Equalizer Calibration (CALIBRATING), and 3) Equalizer Modes (NORMAL). These three menu selections are selectable under EQ CAL.

***All DM240XR Faults and Alarms must be cleared prior to any AutoEQ™ Calibration process. If Data is not present on the DM240XR Data interface causing a data Alarm, Advanced ASI may be selected for the AutoEQ™ Calibration (Advanced ASI inserts Null Packets into the Data Stream).***

## D.8 Reference Acquisition Calibration (Optional Step)

This Section will establish the calibration reference for the AutoEQ™ Interface Card. This optional step may be preformed prior to Equalizer Calibration. This step is optional as default reference(s) are already loaded into the system. This operation will replace the default reference(s) with the actual references measured during the calibration cycle. The modulator must be programmed for an L-Band frequency and the AutoEQ™ RXIF Frequency programmed to match.

1. Install the AutoEQ™ PIIC Interface into one of the available PIIC Slots on the DM240XR.
2. Verify that the DM240XR revision is FO5377-K or greater.
3. Insure that there is a Flash Card installed in the Flash Card slot on the DM240XR.
4. Using the Front Panel menu, set the DM240XR Modulator Data Rate, Modulation type, Roll off, and remaining Modulator parameters to the required system settings.
5. Using the Front Panel menu, scroll to “RXIF” located under the EQUALIZER menu and set the AutoEQ “RXIF”.

***For best results it is suggested that the RXIF frequency used to acquire the reference be the actual frequency used to perform the equalization calibration.***

6. Using the Front Panel menu, set the DM240XR Transmit Frequency (L-Band) to match the programmed AutoEQ RXIF Frequency.
7. Using the Front Panel menu, set the DM240XR TX Output Power to -10 dBm.
8. Connect the DM240XR L-BAND Output (J11) through a 20 dB attenuator then to the AutoEQ Interface RXRF Input (J12) using a suitable L-Band Cable.

**Figure 6. AutoEQ™ Ref Acq Set-up**

IMPORTANT

***For best results place the attenuator pad as close to the AutoEQ port (J12) as possible.***

9. Clear the events of the modulator by scrolling to <MONITOR> then down and over to <PRESS CLEAR TO ERASE EVENTS> and press clear. Verify that the Event LED is now off.
10. Using the Front Panel menu, scroll to "EQ CALIBRATION" and set to "REF ACQ"
    a. After a successful calibration the event log will display "REF ACQ SUCCESSFUL" upon completion of this step. When the REF ACQ is complete, the "EQ CALIBRATION" will revert to "NORMAL".
11. Remove the interconnect cable installed in Step 8 above.
12. Verify through the event log that the system successfully calibrated the reference.

## D.9 Equalizer Calibration

IMPORTANT

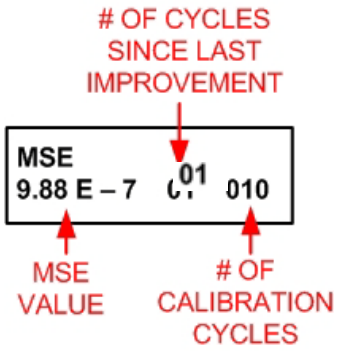
***For best AutoEQ equalization calibration it is recommended that the amplifier be run in its linear range and not saturated.***

The AutoEQ™ RXRF Acquisition range is ± 25 kHz from the programmed frequency and is not programmable. To insure proper operation, the actual center frequency of the carrier should be accurately measured with this measured value programmed into the AutoEQ™. This can be accomplished by generation a CW (Carrier Wave) frequency with the modulator, and measuring the downlink L-Band frequency with an accurate frequency counter or spectrum analyzer.

1. Reprogram the DM240XR Modulator output frequency to the proper operating frequency of the Uplink system (if it was reprogrammed for Section 4.1 above) and the output power to the system operating level. Connect the DM240XR Modulator output to the Uplink system. Enable the modulator and adjust all uplink parameters as required for proper uplink operation.
2. Measure the center frequency of the down converted modulated signal. Using the front panel Menu, reprogram the AutoEQ™ to the center frequency of the down converted signal. The AutoEQ™ programmed frequency must be within ± 25 kHz of the measured frequency in

order to assure proper acquisition of the downlink signal. Connect the AutoEQ™ Input (J12) to the earth Station L-Band Downlink System. The desired downlink carrier should be typically between the range of -45 to -20 dBm.

3. Clear the events of the modulator by scrolling to <MONITOR> then down and over to <PRESS CLEAR TO ERASE EVENTS> and press clear. Verify that the Event LED is now off.
4. Using the Front Panel menu, scroll to "EQ CAL" and set it to "CALIBRATING". This will start the AutoEQ™ Calibration for the Satellite Link.




a. After each data acquisition and processing cycle the MSE display will be updated. A normal calibration cycle will take 60 to 90 seconds, and system typically performs two or three of these cycles.

b. During this calibration, the MSE can be monitored showing the progress of the cycle. A value of 1 E-5 or less will reflect a success full completion of this step. Additionally, event light will come on, and the event log will display "EQ CAL SUCCESSFUL" upon completion of this step. When the EQ CAL is complete, the "EQ CAL" will revert to "NORMAL" and the AutoEQ file will be named "UNTITLED".

CAUTION

***The AutoEQ calibration must be saved or powering down of the system will lose the calibration.***

5. To change the name of the "UNTITLED" file, using the Front Panel menu, scroll to EQ RENAME, Press ENTER, use the Up/DN Arrows on the Keyboard to change the name, and press ENTER to save the new name for the file.
6. Using the Front Panel menu, scroll to "SAVE EQ CAL", and press ENTER to save the file.

## D.10 Equalizer Modes

The AutoEQ feature must be enabled on the DM240XR, and section 4.2 Equalizer Calibration must be performed prior to this section.

**Disable Mode**

To disable a programmed Equalizer Setting, use the Front Panel and scroll to “EQUALIZER”, press the Enter” key, change the selection to “DISABLE”, and press the Enter key. This will disable the Equalizer, and allow for normal operation of the DM240XR.

**Enable Mode**

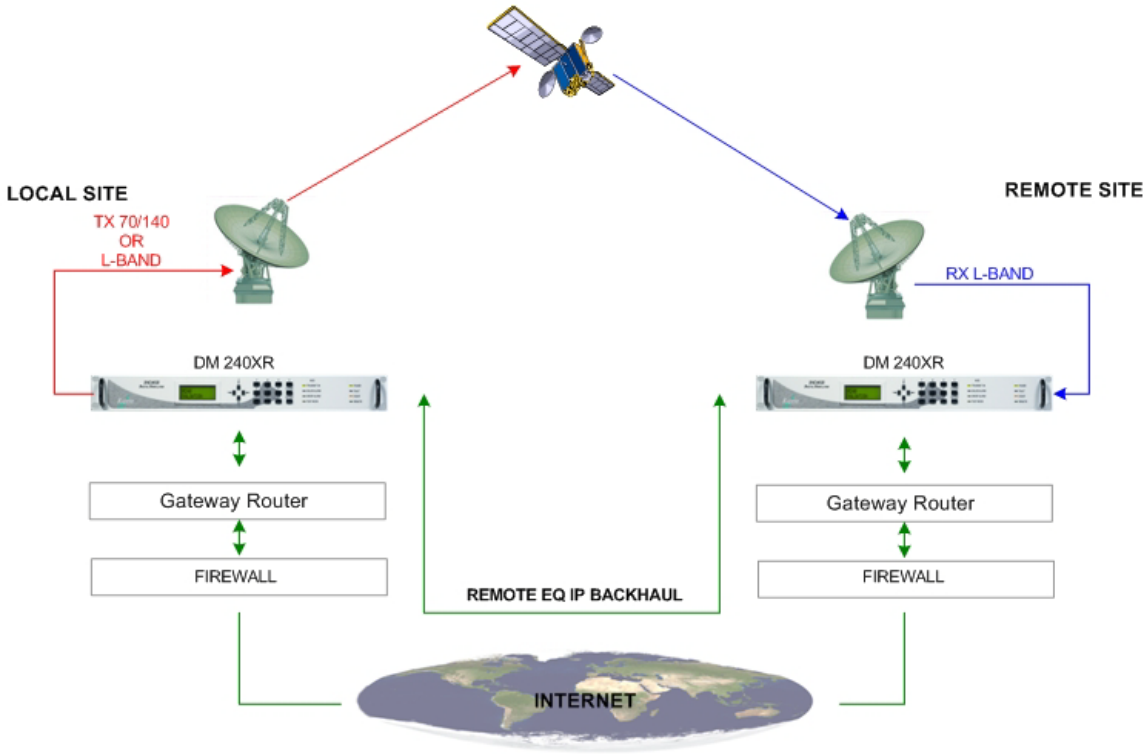
To enable the equalizer, use the front panel and scroll to “EQ SELECT” and press the Enter key. Using the Up/Dn keys, scroll to the desired saved equalizer file, and press the Enter key to select the file. Scroll back to Equalizer, press the Enter key, and using the Up/Dn keys, scroll to “ENABLE” and press the Enter key. This will enter the selected equalizer file parameters into the DM240XR Modulator and initiate AutoEQ™ equalization.

## D.11 AutoEQ™ Remote Operation

To operate the AutoEQ™ system in remote, perform the following setup steps.

1. The TCP/IP Ethernet Setup described in the operator manual
2. The Backchannel Setup as described in Section 4.0
3. Select REMOTE under the EQ RECEIVER Submenu
4. Perform the Operations as described in Section 5.0 for equalization

**Figure 7. Remote AutoEQ™ Site Equalization**



## D.12 Additional Features

### D.12.1 AutoEQ™ Status Indicator

The LED on the back of the AutoEQ™ interface card can provide additional status for the operation of the AutoEQ™ system.

| | |
|---|---|
| Short Blink Green | Heartbeat, board ready for operation. |
| Solid Green | AutoEQ™ test pattern lock. |
| Solid Yellow | AutoEQ™ data being accessed. |
| Blink Red | AutoEQ™ test pattern unlocked. Signal error. |

### D.12.2 LNB Power Connector

On the back of the AutoEQ™ interface card is the connector J13 that can be used to insert LNB power to the J12 SMA connector to feed DC to the LNB.

Mating Connector: PP3-002A 5.5mm x 2.1mm x 9.5mm In-Line DC Power Plug. (www.cui.com)

# METRIC CONVERSIONS

## Units of Length

| Unit | Millimeter | Centimeter | Inch | Foot | Yard | Meter | Kilometer | Mile |
|---|---|---|---|---|---|---|---|---|
| 1 millimeter | 1 | 0.1 | 0.0394 | 0.0033 | 0.0011 | 0.001 | $1 \times 10^{-6}$ | $6.214 \times 10^{-7}$ |
| 1 centimeter | 10 | 1 | 0.3937 | 0.0328 | 0.0109 | 0.01 | $1 \times 10^{-5}$ | $6.214 \times 10^{-6}$ |
| 1 inch | 25.4 | 2.54 | 1 | 0.0833 | 0.0278 | 0.0254 | $2.54 \times 10^{-5}$ | $1.578 \times 10^{-5}$ |
| 1 foot | 304.8 | 30.48 | 12 | 1 | 0.3333 | 0.3048 | $3.048 \times 10^{-4}$ | $1.894 \times 10^{-4}$ |
| 1 yard | 914.4 | 91.44 | 36 | 3 | 1 | 0.9144 | $9.144 \times 10^{-4}$ | $5.682 \times 10^{-4}$ |
| 1 meter | 1000 | 100 | 39.37 | 3.2808 | 1.0936 | 1 | 0.001 | $6.214 \times 10^{-4}$ |
| 1 kilometer | $1 \times 10^{6}$ | $1 \times 10^{5}$ | $3.938 \times 10^{4}$ | 3.281 | 1093 | 1000 | 1 | 0.6214 |
| 1 mile | $1.609 \times 10^{6}$ | $1.609 \times 10^{5}$ | $6.336 \times 10^{4}$ | 5280 | 1760 | 1609 | 1.609 | 1 |

## Temperature Conversions

| Temperature | ° Fahrenheit | ° Centigrade |
|---|---|---|
| Water freezes | 32 | 0 |
| Water boils | 212 | 100 |
| Absolute zero | -459.69 | -273.16 |

| Formulas |
|---|
| ° C = (F - 32) * 0.555 |
| ° F = (C * 1.8) + 32 |

## Units of Weight

| Unit | Gram | Ounce Avoirdupois | Ounce Troy | Pound Avoirdupois | Pound Troy | Kilogram |
|---|---|---|---|---|---|---|
| 1 gram | 1 | 0.03527 | 0.03215 | 0.002205 | 0.002679 | 0.001 |
| 1 oz. avoir. | 28.35 | 1 | 0.9115 | 0.0625 | 0.07595 | 0.02835 |
| 1 oz. troy | 31.10 | 1.097 | 1 | 0.06857 | 0.08333 | 0.03110 |
| 1 lb. avoir. | 453.6 | 16.0 | 14.58 | 1 | 1.215 | 0.4536 |
| 1 lb. Troy | 373.2 | 13.17 | 12.0 | 0.8229 | 1 | 0.3732 |
| 1 kilogram | 1000 | 35.27 | 32.15 | 2.205 | 2.679 | 1 |

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